

"OFFICIAL JOURNAL OF THE UNITED STATES ATV SOCIETY"

# AMATEUR TELEVISION MAGAZINE™

JANUARY 1985 VOL. 15 NO. 1

PUBLISHED MONTHLY

"OUR 18TH YEAR"

\$2.00

## 51F SPACELAB II SHUTTLE TO CARRY SSTV REPEATER

LATEST ARRL PROPOSED 1240-1300 MHZ. BANDPLAN 12 MHZ. SPLITS & 5 ATV CHANNELS

IBM PC/TRS80C PROGRAM LISTINGS FOR ROBOT 1200 COLOR SSTV CONVERTER

SPECIAL FSTV REPEATER ISSUE!

TEAR-OUT USATVS MEMBERSHIP CERTIFICATE INCLUDED!

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From The  
Staff at "A5"

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XF-9B-02	USB	2.4 kHz	8	95.90
XF-9B-10	SSB	2.4 kHz	10	125.65
XF-9C	AM	3.75 kHz	8	77.40
XF-9D	AM	5.0 kHz	8	77.40
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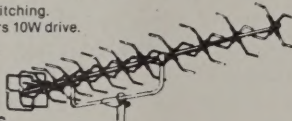
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8 by 8 Vert. pol	D8/2M-vert	12.3 dBd	ASK
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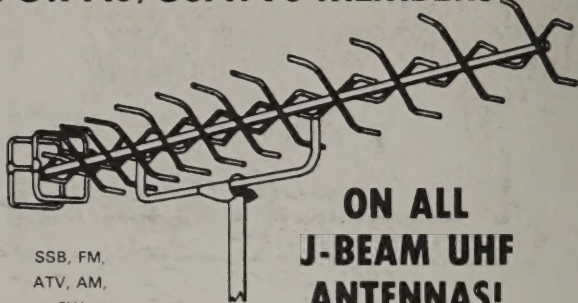
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NEW!		
10 + 10 XY J-Twist (2M)	11.3 db gain	<b>\$79.95</b>

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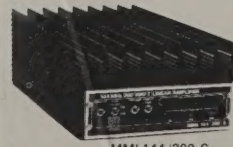
MML432/30-L



MML432/50



MML432/100



MML144/200-S

PRODUCT	Input Power	Output Power
MML144/30-LS	1 or 3W	30W
MML144/50-S	10W	50W
MML144/100-S	10W	100W
MML144/100-HS	25W	100W
MML144/100-LS	1 or 3W	100W
MML144/200-S	3, 10 or 25W	200W
MML432/30-L	1 or 3W	30W
MML432/50	10W	50W
MML432/100	10W	100W

MMT 144-28 \$179.95  
MMT 432-28 (S) \$269.95  
MMT 439-ATV \$349.95  
MMT 1296-144 \$339.95  
MMX 1268-144 \$259.95

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AND THE UNITED STATES ATV SOCIETY"

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## HAPPY NEW YEAR!

A brand new year 1985! The work continues toward further organization of the USATVS. We are getting some good responses from you the members. Congratulations to Tom O'hara for accepting his appointment as Chairman of our "Frequency and Mode Protection Committee". Tom's (and others) work on the recent ARRL VUAC (WD4FAB) 900 and 1240-1300 Mhz. bandplanning marathon sessions "saved the bandfor ATV'ers". It was a strong showing by USATVS members both at Cedar Rapids, Iowa (Central States VHF Conference) and at several Southern California SCRRBA meetings that proved the need for such a lobbying group on behalf of ATV'ers. I hope the enthusiasm continues.

## TV SETS

I have always been a crusader on the testing out of different TV sets for FSTV downconverter receiving. Our growing local group probably gets tired of hearing me always comparing my "hot" SAMSUNG 12" B/W TV against other models. I have played with probably a dozen different sets in the past year and they all came up with different results. It's hard to pick a "hot" set in a discount or drug store since they generally won't let you take it home and try it out. I look for a couple things that usually tips me off to a good sensitive tuner. 1-I turn the TV to a channel that has no signal-just snow (that really gets other customers wondering if they let me out only on weekends). Some sets have a blurry, big pixel grouping display while others have a sharp, precise small grain snowy display. The later makes a world of difference of ATV pictures. 2-Finding a weak fringe video signal, I also compare which sets lock up and those that don't. Usually the store display fixture is feeding all sets on splitters, usually with some sort of cheap distribution amplifier. 3-On the same weak signal, I also listen to the FM subcarrier. Some pick up the audio earlier than others. Midland, Sampo, THK and Panasonic's seem to be the most sensitive of the ones that I've tried. TARGET Stores just had a sale on a B/W 12" SAMSUNG Model BT-303NK for \$49.95. I bought another to add to the fleet and it seems to be very good. If you are still using the older tube sets, your missing alot. Remember, the TV set is your receiver!

## BELDEN 9913 COAX

We've been making alot of noise about BELDEN 9913 cable lately. Bob Wilson WB0RTM of Van Horne, Iowa writes that on a 100 foot run of Belden 8214 with 10 watts applied, he saw 4 watts at the other end. On 200 feet of 9913, he saw nearly 6 watts. He's glad he paid a few extra pennies for the rated 2.1 db loss 9913. Better order some this spring at Dayton?

Channel 1

## SPACE SHUTTLE VIDEO

Question- As I sat in my ATV Shack one evening, editing and duplicating a VHS tape for K4NHN in South Carolina (that I owed him for several months), I inserted some of the landing of W5LFL's STS-9 Space Shuttle Mission landing back in a year ago (Gee, has it been that long already?). Then it hit me like a ton of bricks as I watched the landing. I was watching "live Television pictures emitting from one (or maybe two) Jet Fighter escort planes, a hovering helicopter, a fixed camera on the ground and at least one land mobile unit. Was video control switching being handled at Edwards Air Force Base? I began to wonder what frequency were they doing all this FSTV video on? UHF, Microwave or ? If indeed it was received by them, it certainly could be received by intrigued Ham TV'ers. Perhaps the frequencies are secret. Could the high altitude chase plane's video be seen for hundreds of miles? AM or "FM TV Video? How about direct viewing during launches? More importantly, at what frequency does the Shuttle send it's TV pictures back to earth? I know we watch it on SATCOM FIR or other RCA leased NASA birds, but how is it getting to the uplink facility to be transmitted? What are the "TV" control audio frequencies? How is all this material being fed back to other NASA facilities, by uplink Satellite, telephone wires? How about it California, Florida and Texas ATV'ers?

We are always interested in finding ways to keep improving your USATVS Journal. Many Amateur periodicals use an ADVERTISER'S INDEX guide. I must admit, that I use this type of handy reference quite often myself. So, we will try it here in "A5". If you like this new feature, we will make it permanent. Let us hear from you! 73's WB0QCD

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# Turn a few hours work into years of fun with Amateur Television.



## ATV-2

**\$59.95**

### ATV Converter\*

The new ATV-2 converter has two super sensitive RF Pre-amplifier stages using the low noise MRF-901 (1.7 dB NF) transistors. The ATV-2 tunes from 420-450 MHz and down converts to channels 2, 3, or 4 on your standard TV set. The circuit uses durable microstrip design for stability and simplicity. The combination of a dual RF stage, the microstrip design, and the hot-carrier diode double-balanced mixer reduces UHF TV intermod problems. The local oscillator is varactor controlled for ease of tuning. An additional feature not found on other ATV downconverters is the incorporation of a post amplifier stage (6 dB min gain) following the double-balanced mixer. This post amplifier stage is used to overcome the conversion loss of the mixer. The Post-amplifier also delivers a signal level that is acceptable to the TV set to overcome the TV set's sensitivity threshold. The addition of the Post-amplifier circuitry is most noticeable on every weak signal reception. Overall the Communication Concepts ATV-2 downconverter is just what you need to enjoy amateur television to the fullest extent.

#### ATV CONVERTER:

- ATV-2-Wired and Tested..... \$59.95 each
- ATV-2-Pk Partial Kit..... \$44.95 each
- ATV-2-PCB Printed Circuit Bd only..... \$10.00 each
- ATV-2-I Instruction Manual Only..... \$5.00 each

#### Specifications

- RF Input.....420-450 MHz
- RF Output.....Channels 2, 3, or 4
- DC Input.....+12 Vdc at 50 ma
- RF Stages.....2 (MRF-901)
- LO.....Varactor Tuned
- Fine Tuning Range.....Approx. 30 MHz
- Pre IF Stage Gain.6 dB Minimum

### Audio Squelch Control

You have a squelch on your 2 meter equipment; why not add a squelch to your ATV monitor. Now you can avoid the major problem of operating ATV—the annoying hiss and static when the signal is not present. With the ATV squelch, you no longer have to turn the volume down when the signal disappears and risk the chance of missing a signal.

The squelch easily connects to the TV receiver audio stage without modification of the TV, since the squelch circuit contains its own audio output stage. You must provide your own speaker. Operator safety is provided by using transformer isolation between the receiver and the squelch circuit, thus eliminating the shock hazard when using a "hot chassis" type TV receiver.

**\$34.95**

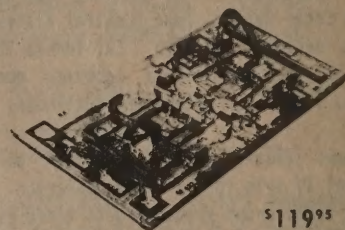


**SIL-K** Complete Kit—includes a detailed instruction manual, printed circuit board and all electrical components. Kit does not include case, speaker and regulated power supply (10 to 15 volts @ 250mA).

**SIL-PCB** Printed circuit board only \$10.00

### 100 Watt Linear Amplifier

Now you can get on the air with a high power 100 watt class B linear amplifier for SSB-FM or ATV on the 420 to 450 MHz band and still not spend a lot. This kit is described in Motorola engineering bulletin EB-67 and is available in a number of configurations. For full output, a minimum of 16 watts is required for excitation with an input SWR of not higher than 2:1. Output will maintain stability with a 3:1 collector mismatch at all phase angles. A designed-in low-pass filter suppresses the 2nd harmonic to at least 63 dB down. An external power supply capable of providing 28 VDC, regulated, at 10 amps is also required.

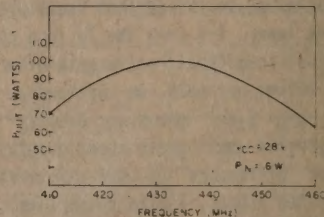
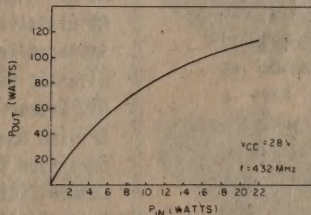


**\$119.95**

**KEB-67-PK** Kit includes detailed step-by-step instructions, printed circuit board, and all electronic components as shown.

**KEB-67-PCB** Printed circuit board only \$14.00

**KEB-67-I** Instruction manual only \$5.00



## P.C. Boards

The FCC does not allow us to sell Broadband RF amplifier kits in the HF range, therefore we can only offer the printed circuit board and parts on a piece-by-piece basis.

140 watt power amplifier as described in Motorola engineering bulletin EB-63. **EB-63-PCB**

100-180 watt power amplifier as described in Motorola application note, AN-762. **AN-762 PCB**

300 watt power amplifier as described in Motorola engineering bulletin EB-27A. **EB-27A PCB**

Transformers, transistors and other parts are also available.

## We also specialize in hard-to-find components.

In addition to our kits, we also stock parts for other Motorola application notes and engineering bulletins. We have an in-depth stock of Motorola VHF and UHF transistors. Underwood metal clad mica capacitors (Unelco). Kemet chip capacitors. Cambion RF chokes and Ferroxcube Ferrite beads and RF chokes plus other difficult to find parts. If you are having trouble finding a part, call us, we probably have it in stock.

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2W In = 90W Out  
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1W In = 15W Out  
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## **D1010 (430-450 MHz)**

1W In = 20W Out  
2W In = 45W Out  
10W In = 100W Out

ATV Model D1010N \$319.95

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## **A MIXED BAG...**

Mike; "Thanks for the advanced December 84 "A5" copies, I loved the back cover. Also thanks for the 85 ARRL Handbook. I still would like a copy of your WRAASE SC-1 Converter manual, and while you're looking that one up, can you find me the Pinout for the camera connector on that AKA1 VHS Deck you had? I wanted to give mine to a guy I work with, but as usual since the move down here my manual is no where to be found. Now for the meat of the letter. I would like to send an A-5 Subscription and one or two of your basic SSTV manuals to the Russian (RA4LBZ) with the compliments of myself and "A5" magazine (just like before). I don't know what manuals are available, maybe you should send me a catalogue. Anyway fix up a package with some back issues and some manuals, as well as a subscription and tell me how much. I'll send you a check. I'll even pay the extra postage if you like. In addition I want to say thanks for running my ad. I had terrific response. Got rid of all of it, think I'll run another soon. I've got three articles on lenses written up, now they just have to be typed and submitted. That's about it from OKIE LAND for now. It sure would be nice to talk to you. Call sometime, collect if you like. I have a timebase corrector ready to ship to you for your basement production studio. Soon as all the Dog and Pony Shows here at work are out of the way, I'll get er' down to the trucking company." 73's Mike, W08CTA. EDITOR'S REPLY- Sorry, sold the WRAASE SC-1 unit Mike, Try KA6OLD. Enclosed is a copy of the 18-Pin Video plug printout in an article by Frank Wolczak WA0IWF (ever heard of him?). I was way ahead of you on RA4LBZ Russian SSTV'er. Enclosed are copies of his letters to us. I sent him half a dozen A5's and our ATV Book- all at no charge. He'll be delighted to hear of his new 1 year subscription to the USATVS Journal. I'll go half with you on it Mike. Glad the "A5 Classifieds" worked out for you. They usually do. Send the TIMEBASE Corrector! Would it help also in our NYPAL FSTV Repeater Project? (See block diagram Channel 18). 73's W08RCD

## **HAPPY WRAASE FAX ENTHUSIAST!**

Dear Mike, "Thanks for sending the WRAASE SC-1 SSTV/FAX Converter Unit so rapidly. So far, I have not made any contacts on SSTV or FAX, as my work schedule hasn't allowed much operating time. However, I operate a 60ES WX Satellite Station in conjunction with my work, so the unit is getting a lot of service receiving WEFAX and converting it to 32 SEC SSTV for recording- especially since my FAX machine is disabled. I must comment that the resolution is excellent, giving more detail than the DC-19 FAX recorder, and the SSTV conversion loses very little of the detail even though I am recording on a 20 year old, reel-reel tape recorder. One comment I must make is that I am receiving the satellite pix via "FM", no reception is obtained via "AM", probably due to my FM receiving system- so, perhaps others might be interested in that statement. My monitor is B+W, Hi-Res and the pictures videotape very well. I am very happy with the unit." Regards, Gary Blusti, KA6OLD.

## **REQUEST FOR ARTICLE**

Mike, "How about an article on VSB and how to build one. With the 73cm band getting crowded maybe we ought to think about it. Haven't yet gotten on the air after all these months. Just barely got my KLM 34xa in operation on the "DC" bands, but I'm getting closer to FSTV. Met Tom for the first time last month. Whatever happened concerning that article on narrow band TV- getting the fat out of TV? Continued success- your magazine is getting better all the time." Alan Roberts W6WEZ Channel 3

**A5/USATVS**

**"Letters To The Editor"**

**P.O. Box H,**

**Lowden, Iowa 52255**

All letters addressed to this column are kept on file by the Publisher for a period of one year and are available for public inspection by the general membership. Some letters are edited versions for shorter content.



**TOM O'HARA W6ORG APPOINTED AS  
CHAIRMAN OF USATVS "FREQUENCY AND  
MODE PROTECTION" COMMITTEE**

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GREETINGS TOM

CONGRATULATIONS. AS OF NOVEMBER 1ST YOU WERE SELECTED TO HEAD THE FREQUENCY AND MODE PROTECTION COMMITTEE FOR THE UNITED STATES ATV SOCIETY. YOU ARE AUTHORIZED TO ACT AS OUR REPRESENTATIVE OF OVER 1200 AMATEUR TELEVISION OPERATORS IN THE U.S.A. MORE INFORMATION TO FOLLOW. THIS APPOINTMENT WILL BE ANNOUNCED OFFICIALLY IN THE JANUARY ISSUE OF A5 ATV MAGAZINE.

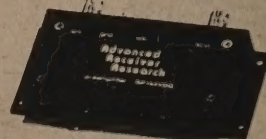
THE 73'S MIKE STONE EDITOR PUBLISHER A5 ATV MAGAZINE  
PO BOX H  
LOWDEN IA 52205

**THE NEED FOR A USATVS  
WAS NEVER SO CLEAR...**

A lot of "behind the scenes" maneuvering has taken place between the head of Dick Jansen's (WD4FAB) ARRL VUAC Advisory Committee and well represented specialized communication interest groups from FSTV, PACKET, AMSAT, EME, SSB, Digital and FM'ers. It was Jansen's QST prepublished 900 and 1240-1300 Mhz. bandplan, that started all the controversy-a bandplan that was drawn up with little initial input from those who actually use the band. Since that time, the plan has been reworked so many times, Jansen's notebook looks as thick as a large Bible. Finally, after months of controversy, things appear to be simmering down a bit. Although his final plan officially submitted at a Fall Meeting to the ARRL Board of Directors was returned as unacceptable to Jansen along with a paid plane ticket to California to work out the differences with these special interest groups, progress was finally made. We compliment the League for seeing potential future troubles in the presented bandplan and returning it for negotiations. After a second, nearly 5-hour meeting hosted by SCRRBA officials, an agreement was reached. Aside from some questionable last minute (after the meeting) note additions by a stubborn WD4FAB, the final "proposed" plan is presented on Channel 9.

(continued on channel 9) Channel 4

**HIGH PERFORMANCE PREAMPS THAT WORK FOR ATV'ERS!**

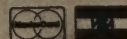


Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
P28VD	28-30	<1.1	15	0	DGFET	\$28.95
P50VD	50-54	<1.3	15	0	DGFET	\$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95
Inline (rf switched)						
SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.8	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	<1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	\$109.95

Every preamplifier is precision aligned on ARR's Hewlett Packard HP8070A/HP346A state-of-the-art noise figure meter. RX only preamplifiers are for receive applications only. Inline preamplifiers are rf switched (for use with transceivers) and handle 25 watts transmitter power. Mount inline preamplifiers between transceiver and power amplifier for high power applications. Other amateur, commercial and special preamplifiers available in the 1-1000 MHz range. Please include \$2 shipping in U.S. and Canada. Connecticut residents add 7-1/2% sales tax. C.O.D. orders add \$2. Air mail to foreign countries add 10%. Order your ARR Rx only or inline preamplifier today and start hearing like never before!

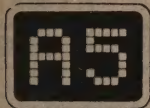
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We need your help! We have some of the Statewide positions already filled. If you live in a state still open, won't you please consider devoting a couple hours each quarter to fill out some questionnaire forms and vote on issues? Let us hear from you today!



# UNITED STATES ATV SOCIETY SECTION MANAGER POSITION ASSIGNMENTS



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Western Pennsylvania

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Minnesota ✓  
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## Introducing The New DA-4 VIDEO DISTRIBUTION AMP

From  
GRIFFIN ENTERPRISES

Have you ever wanted to feed several devices from one video source? The new DA-4 is designed to be fed with standard 1 volt video from a camera, VTR, TVRO, computer, etc., and provides four individually buffered outputs to drive your monitor, ATV XMTR, scope, VTR, etc. It can be installed into existing equipment or built as a free standing unit. Requires 12-15 vdc.

DA-4 Board and Parts Kit ..... \$20.00  
DA-4 Assembled and Tested Board ..... \$30.00

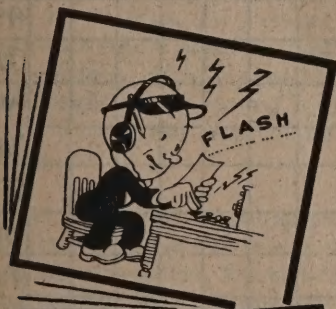
Also available . . . The PROC-AMP 1. This in-line video processor regenerates sync and provides complete control over video and sync levels.

PROC-AMP 1 Board and Parts Kit ..... \$25.00  
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Add \$1.00 Shipping and Handling for each board.  
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We are looking for volunteers to fill the 66 USATV section Mgr. positions. If you have a few hours per quarter to devote to the promotion of the HAM-TV modes, we'd like to hear from you!

Drop us a line, tell us about your ATV interests and we will send you our Section Mgr's Information Kit. (See the Sept. 84 Issue.)

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Hams should be "seen" as well as heard! Thousands of ATV operators across the country are sending great looking color TV pictures (with sound) to each other. FSTV-DX can go hundreds of miles. There are now over 80 Ham Television "Repeaters" relaying these video signals over rough terrain.

Ham Radio UHF-TV is as simple as hooking up a 2 meter rig and antenna. Our "Everything You Always Wanted To Know About ATV" 112-page manual will teach you how to do it (\$9.95 include \$1.50 postage).

Under the guidance of the "United States ATV Society," Amateur TV (FSTV-SSTV-FAX) is growing in activity. And, we've been promoting it now for over 18 years!

Sample Issue - Just \$2.50 ppd.  
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(Published Monthly)  
**A5 ATV Magazine**  
P.O. Box H,  
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52255

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ATV CALLSIGN	STATUS	XMTR	RCV DC	SUB.	ON-CA.	IN. A.	UHF RCVR	B/W CAM	COLOR CAM.	439.25	434.0	432	426.25	1241.0	OTHER	8214	8285	9913	1/2 HL	3/4 HL	7/8 HL	OTHER	PREAMP	AMP	VSB FILTER	J-BEAM	KLM	CRAFT	K2RIW	HOME BREW	OTHER	VCR	VIDEO ENHANC.	SPECIAL EFFECTS	COMPUTR	2 MTR FREQ.	BEST DX	
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## ATV PHOTOGRAPHIC LINE REPRODUCTIONS

by Max Gould K6GLG  
2828 North Beachwood Drive  
Hollywood, CA. -90068

Max Gould K6GLG is a professional "Hollywood" photographer. His love for photography and strong interest in Amateur Radio (in particular ATV) makes a unique combination of visual video photography. Max has submitted quite a number of his photographic works for publication in "A5 ATV MAGAZINE", the most rememorable being that of Norm HAGVOJ (also of Hollywood) sitting in his ATV shack chair, cigar in mouth, looking like a Mafia King with a title under the picture saying; "Would You Dare Give A P1 Signal Report To This ATV'er?". Max had a similar article to this one published in The USATVS Journal's May 1983 Volume 13 No. 5 edition entitled "Budget Motion FSTV" (Channel 6). In this article, Max showed various methods that he had designed and constructed for "moving" callsign or CQ'ers used on ATV. The article sparked alot of homebrew construction around the country. We welcome Max back with his 2nd installment on the same topic. Keep the photos and articles coming K6GLG! (W80BCD)

### PHOTOGRAPHIC REPRODUCTIONS

Shown here are some photographic line reproductions that I have been transmitting "over-the-air" on ATV, FAX and SSTV. They always get good comments by the "hams" that see them. They find the pictures refreshing and imaginative when compared to the simple and plain looking ID callsigns that are handdrawn with a felt tip marker or pencil. I am no great artist by any means. All I use are cutouts or paste up art work which I find in magazines, books or printed ads. With simple sissors, knife or razor blade, glue or paste, and a little thought on what you want to create, you are on your way to better, more entertaining pictures to transmit "over-the-air".

If one is endowed with photographic equipment and a dark room, there is no limit as to what can be done. Necessity is the mother of invention. Show me a "ham" that can not think up a hundred different ways to do something that the instructions did not call for. First, when cutting out your selected pasteups they need to be trimmed as close to the original subject as possible. Glue stick from the kids school section in stores seems to work the best. It not only adheres well, but is easy to unpeel and reposition for any needed changes. We have all tried photographing a pasted up pictureboard direct from the ATV camera but the camera's eye of course detects the raised edges and blemish marks from the original surface. Step two involves taking this completed pictureboard under a 35mm or similar photographic hardcopy camera and "taking a picture of it". Once developed properly, the new camera subject is now totally presentable (without flaw) for transmitting. It might be noted here, that non-glossy photographic paper might be best to reduce any glare reflection problems from lights and the focused camera. Also, texture can be added during the developing process (lightening and darkening) as well as special effect filters for creativity. A flipboard type of holder might also be built to show off your new designs individually.

With today's MACRO positions on most color cameras, the subject pictureboard can actually quite small in size with closeups used for handier ease of operation.

It is hoped that my ideas and tinkering can spark the interest of others along the same line. If it does, how about dropping me a note and let me know what you have accomplished? Don't forget to send me a picture of yourself and your ATV Shack? Give this type of project some thought and you'll come up with good results. Try it, you just might become a great paste up artist? 73's -K6GLG



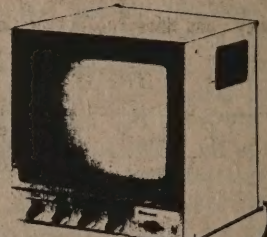


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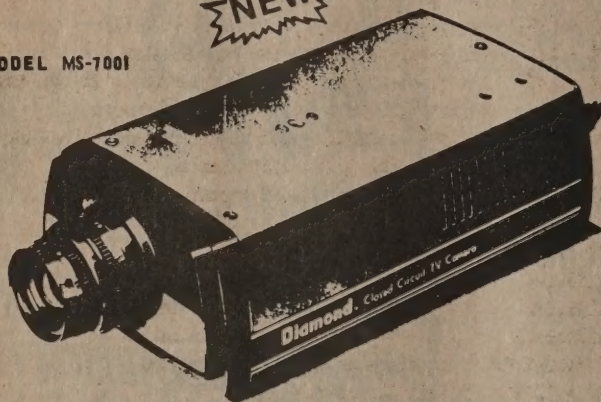


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### SPECIFICATIONS:

Vidicon: 20PE20 2/3" separate mesh,  
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Resolution: 600 lines minimum

Scanning System: NTSC (60 hz line freq. 525  
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Interlace: Random Interlace

Bandwidth: 8 MHz

Amplitude Response: Greater than 50% at  
250 lines.

Sensitivity: (w/F1.4 lens, 75% light reflect.)  
5 Lux (useable scene) 10 Lux (full video)

Signal-To-Noise: better than 40db. (incorporates  
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Automatic Light Range: 10,000:1

Gray Scale: Min. 10 steps

Video Output: 1.0 V p-p composite video  
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Load Impedance: Standard 75 ohms

Output Connector: Standard UHF SO-239 type

White Clipper: Keeps signal within preset  
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Black Clamp: Minimizes monitor readjustment  
with bright highlights.

External Control: Beam, Target, Focus,  
Vidicon positioning (for extreme closeup  
applications), On Off w pilot light

Power Consumption (approx): 12 watts on  
120VAC version and 10 watts on 24VAC

Finish: Silver Gray

Dimensions: 229mm length; 110mm width;  
73mm height

Weight w/ lens: 1.6kgs

Operational Environment: 10°C to 55°C  
Humidity: 0 to 95% relative

Lens Mount: Standard 'C' mount.

Camera Mount: One (1 4" x 20) hole in base  
One (1 4" x 20) hole in  
cover for top mg.

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# ARRL SENDS VUAC BACK TO CALIF. FOR FURTHER 23CM. BANDPLANNING

USATVS Members Win 12 Mhz. ATV splits  
with 3 recognized channels and  
2 simplex designated areas  
(continued from channel 4)

Thanks to several USATVS and ATV lobbying enthusiasts (and especially the time spent by a quick appointed Chairman of the USATVS Frequency and Mode Protection Committee- Tom O'Hara W4OR6), ATV (FSTV) was saved from near oblivion on the 1248-1300 Mhz. segment. The designated, semi-protected, ATV Repeater Channels were planned "WITH THE PUSHED FOR 12 MHZ. SPLIT SPACING." Two additional ATV shared operating areas exist for simplex operation. ATV was removed from earlier plans next to the nationally designated "FM Calling Frequency". The Final (?) plan looks pretty coordinated for all groups (except ICOM Users). We were left with just two pondering questions; 1. "What would have happened if ATV'ers had not of responded?" and 2. "I wonder if 'AS' can get a lengthy technical article from WD4FAB on SSB-ATV (that should be interesting- modulated TV with no-carrier to ride on). It will probably come into us about the same time as "Cheap Vestigal Sideband Filtering" by Bill Tynan. - WD00CD

Note: All frequencies are in Mhz.

## NOVEMBER 9-12th MEETING PLAN FINAL PROPOSAL

1240 - 1246	ATV #1	(1,2)
1246 - 1248	Narrow-bandwidth FM point-to-point links and digital, duplex with 1258-1260	(1)
1248 - 1252	Digital Communications	(1,7,8)
1252 - 1258	ATV #2	(1,2)
1258 - 1260	Narrow-bandwidth FM point-to-point links and digital, duplexed with 1246-1248	(1)
1260 - 1270	Satellite uplinks, reference NARC 1979	
1260 - 1270	Wide-bandwidth experimental, simplex ATV	(4,5)
1270 - 1276	Repeater inputs, FM and linear, paired with 1282-1288, 239 pairs every 25 kHz, e.g. 1270.025, .050, .075... 1275.950, .975. 1271.0-1283.0 uncoordinated test pair	(1,3,8,10)
1276 - 1282	ATV #3	(1,2)
1282 - 1288	Repeater outputs, paired with 1270-1276	(1,3,8,10)
1288 - 1294	Wide-bandwidth experimental, simplex ATV	(5)
1294 - 1295	Narrow-bandwidth FM simplex services, 25 kHz. channels	(6)
1294.5	National FM simplex calling frequency	
1295 - 1297	Narrow bandwidth, weak-signal communications (no FM)	
1295.0-.8	SSTV, FAX, ACSB, experimental	
1295.8-1296.0	Reserved for ENE, CW expansion	
1296.0-1296.05	ENE-exclusive	
1296.07-.08	CW, SSB beacons	
1296.1	CW, SSB calling frequency	
1296.4-.6	Crossband linear translator input	
1296.6-.8	Crossband linear translator output	
1296.8-1297	Experimental beacons (exclusive)	
1297 - 1300	Digital Communications	(1,7)

### Footnotes:

(Added after meeting by WD4FAB)

1) Coordinated assignments required.

- \*\* 2) ATV assignments should be made according to modulation type (for example, VSB-ATV, SSB-ATV, or combinations). Coordination of multiple users of a single channel in a local area can be achieved through isolation by means of cross polarization and directional antennas. SSB ATV may be used, but only when local and regional activity levels permit. The excess bandwidths from such users are secondary to the assigned services.
- 3) Coordinate assignments with 100 kHz channels, beginning at the lower end of the segment until allocations are filled, then assign 50 kHz channels until allocations are filled before assigning 25 kHz channels.
- 4) Wide bandwidth experimental users are secondary to the satellite service and may be displaced upon the installation of any new satellites. Users are EIRP-limited to the noise floor of the satellites in service and may suffer interference from satellite uplinks.
- 8) Provide guard bands at the higher frequency end of segments, as required, to avoid interference to ATV.

\*Footnotes edited for condensed spacing

\*\*Added by WD4FAB after the official meeting

Channel 9

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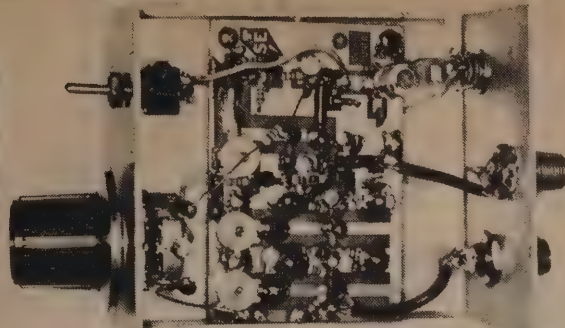
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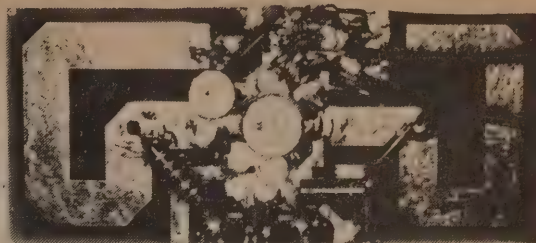
# ATV KITS AND MODULES



SA-1



DC-1



LA-1



A-2 "Build it Yourself and Save!"



P-1



VM-2

**VM-2 VIDEO MODULATOR** — Wideband collector video modulator for solid state exciters such as those from GLB and Hamtronics. Input for 4.5 MHZ audio sub-carrier. 2½" x 1½"; **\$15.50** kit, **\$19.95** assembled.

**A-2 4.5 MHZ AUDIO SUB-CARRIER** — Accepts audio from VCR or GLB audio processor to provide ATV audio on TV set. Has on-board voltage regulator and shielded inductor. 2¾" x 1"; **\$19.95** kit, **\$25.95** assembled.

**SA-1 VIDEO SYNC AMP** — Provides separate video sync gain control for VM-2 above or SE - 1a transceiver. Useful when driving solid state amps. 1¾" x 1¼"; **\$15.95** assembled, **\$12.95** kit.

**DC-1 UHF CONVERTOR** — Varactor tuned with 2 RF stages. BFO-74 input standard. Double sided stripline design. Outputs to TV ch. 2, 3, or 4. Can be tower mounted. 11 — 14 vdc. 2" x 3"; **\$39.95** kit, **\$54.95** assembled, **\$89.95** complete in box. **Box kit \$30, includes all hardware for the DC-1.**

**P-1 WIDEBAND LOW NOISE UHF PREAMP** — Uses BFO-74 transistor for min. 18 db gain and 0.6 db noise figure. Covers 420—450 MHZ band. Other frequencies received with change in input inductor. 2¼" x 1 3/8"; **\$22.95** kit, **\$31.95** assembled.

**LA-1 UHF AMPLIFIER** — Uses 15 watt MRF641 transistor with 7.8 db gain @ 470 MHZ. Stripline inductors with on-board pin diode antenna switching for a receiver. Designed for wideband color video with exciters such as the GLB T450L that provides up to 3 watts drive. Drilled and tapped heatsink included (4½" x 1¾"). 1 to 3 watts drive typically gives 6 to 18 watts output. 12 — 14 vdc operation @ 4 amps max. Double-sided board is 4½" x 2". **\$79.95** assembled with test data.

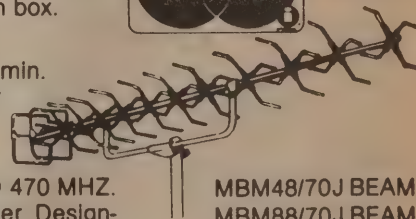
**LA-45 UHF AMPLIFIER** — Uses MRF 646. Input power of 6-15 watts typ. gives 20-50 watts output. Biased for linear operation. Kit includes all parts, instructions and 4.2"x 3" double-sided stripline board. Needs 12-14 vdc @ 9 amps max. **\$64.95** kit, assembled **\$80.** 4"x 5.5"x 1.75" heatsink **\$15.00.**

**GLB T450L TRANSMITTER** — 4½"x 2" RF board typically supplies 2—3 watts FM output, 1—1½ watts average video RF output. Changes for wideband video modulation provided. Comes with crystal for 439.25 MHX audio kit above. Also included separate 1"x 4" audio processor board which supplies audi for FM modulation for the A—2 4.5 MHZ audio kit above. 12—14 vdc @ 2 amps max. **\$69.95** kit, **\$89.95** assembled and tuned. \*Kit now with pre-wound coils\*

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**MBM48/70J BEAM**  
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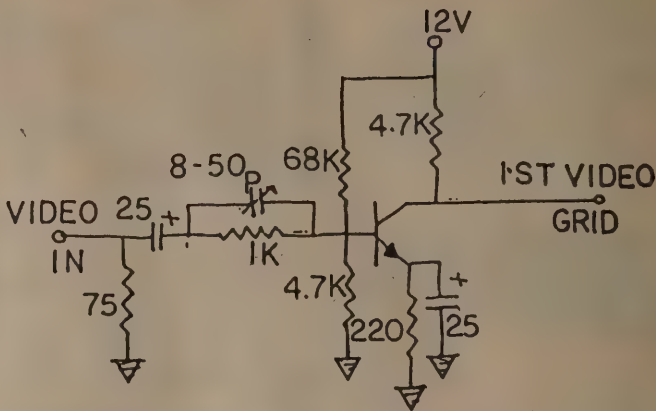
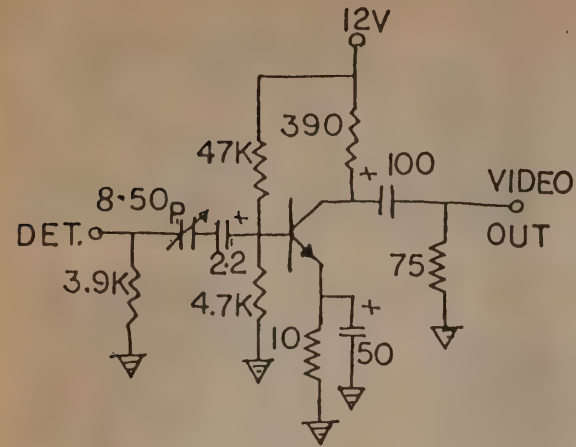
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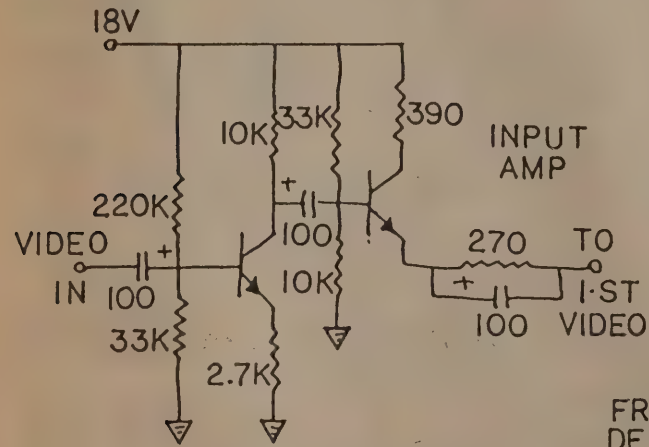
**VELDMAN'S VIDEO COOKBOOK RECIPES RETURN!**

by Mike Veldman WDOCTA  
P.O. Box 1358  
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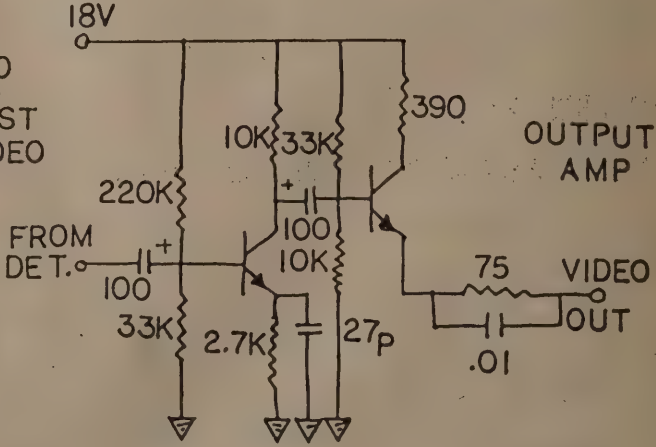


VIDEO BUFFER AMPS FOR TUBE SETS #109

Here is a simple set of circuits to change a tube television set into a video monitor. The buffer amps shown here do not offer much gain but do provide excellent isolation. The transistors are 2222 or equiv. The trim cap is a ceramic occasionally it is necessary to dc isolate the buffer either from the det. or grid. And depending on where the sync is picked off it may be necessary to capacitively couple the video at the first video grid to the sync amp.



For other WDOCTA Video Cookbook Recipes, See "A5" Vol. 13 #7, 8, & 9 or send SASE to "A5/USATVS Membership Services," P.O. Box H, Lowden, Ia. 52255.

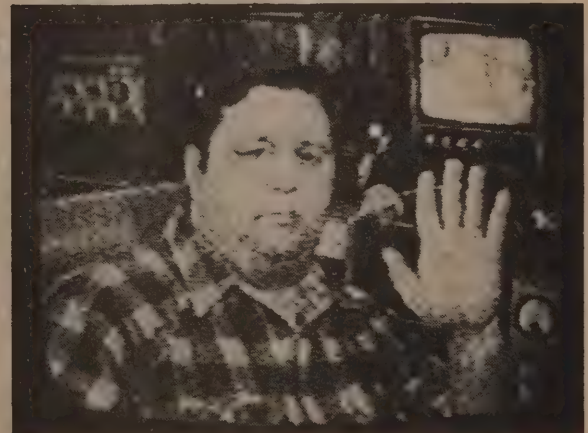
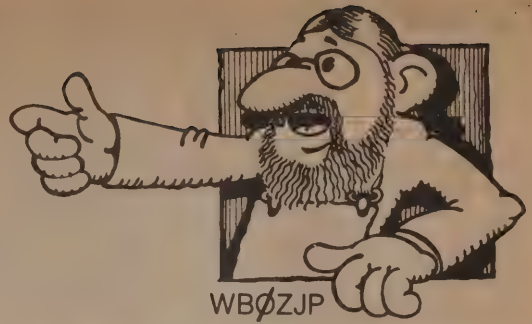


VIDEO BUFFER AMPS FOR TRANSISTOR SETS #110

Here is a set of buffer amps to change a solid state television set into a video monitor. The transistors used are 2n 2222 ecq-123a, ge-20, 2n3904, etc. The circuit will also work well at 12v if 18v is not available.



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# LET'S BUILD AN ATV REPEATER!

By Tom O'Hara, W6ORG

Putting up a repeater on ATV is much more difficult than FM due to that old demon desense. With FM you can use relatively simple and available high Q cavity filters to keep the transmitter and its sidebands from capturing out the receiver. Bandwidth is only 15 kHz for FM, so that 5 mHz away, the high Q filter attenuation is way down. With ATV you have to have a flat 5 mHz passband and at the same time kill any transmitter energy only 12 mHz away. This is quite a requirement for a filter, but necessary for good color and sound with an inband repeater. Consider that if your repeater receiver has a 1 microvolt sensitivity (-107 dbm), and that your repeater transmitter is running 10 watts (+40 dbm), the total rejection necessary is 147 db!

The minimum basic repeater is presented here by function and fully discussed. You may not want to follow the design exactly depending on what you have available already and how much you can afford. If each part is bought new as described your complete basic repeater system will cost under \$2000. The requirements discussed will allow you to better decide what to use or try substituting. Also, by using the functional module approach, later as you see possible improvements and additional features, it's much easier to add on without disrupting the whole system.

## SYSTEM CONSIDERATIONS

Before you spend a dime on equipment, you might want to consider some alternatives and make some tests. First and most important question is, what will the repeater do for the area that simplex is not doing? Unless you are well off, the dollars and time must be weighed against the expected results. If all the atvers in your area are within a 15 mile radius in a valley or flat terrain, then perhaps simplex with omni antennas would work as well. If all the atvers in your area can work each other but must rotate their beams then you must weigh the cost vs the inconvenience of beam rotation and those outside the antenna pattern main lobe during a round-table being left out. Repeaters really work well for bringing together groups on each side of terrain obstructions, public service functions such as being able to key up the local weather radar in the tornado belt, club and swap nets, etc., or any operating where there are many who have to watch at the same time.

The second consideration is what frequencies to use. If you put on an inband repeater, there is not enough room in the 420 to 450 mHz band to also have a simplex frequency without the sidebands giving some interference. As UHF FM gets more popular and summer inversion skip comes in, 439.25 mHz may experience some interference. The lowestest input frequency if interference is experienced is 434.0. Remember we need enough separation for the filters. The VUAC (APRIL VHC and UHF Advisory Committee) in 1979 suggested 421.25 mHz and with the Spectrum International PSF-421-ATV interdigital filter to keep the LSB down 50 db, this frequency has worked well for the repeater output.

The best thing to do is to first contact other band users in the area, frequency coordinating committee, or ARRL SCM to find out what frequencies are in use. Once the crystal is bought, nobody wants to change. So a little checking will prevent a hassle later, plus let others know so they don't plop down on your subcarrier frequency, or you might even get them on atv.

Channel 14

Crossband repeaters have two distinct advantages. First they allow the users to see their own video coming back without any special filtering at their stations. Usually 5 to 10 ft. vertical separation between the two antennas is enough. This allows adjusting their own equipment and pictures without depending on someone else talking it in. If your group is into computers or RTTY you can see the computer output come up as you push the keys and know how its coming through. Secondly, it frees up space for a simplex frequency so that more than one person at a time in your area can have an atv QSO. 526.25 mHz is usually used for the simplex frequency, 434.0 repeater input, and 1253 mHz for the repeater output. While there is 9 db more path loss on 1200 vs 400 mHz, this is made up by having the tuneable downconverter mounted at the antenna which saves the feed line loss, and by smaller but higher gain antennas. The 1296-LY 28 element loop yagi for example has about 18 dbd gain. Having the repeater outputs on 1200 mHz also allows more repeaters in adjacent areas to operate without interference. There is enough spectrum to have outputs or even intertie links on 1241, 1253, 1265, 1277, or 1289 mHz.

## CHECK OUT THE SITE

Once you have determined its worth while to put up a repeater, take the time to thoroughly test out the site. Set up a time when those in the area to be served can give you a report on how well you are getting out from the site. Take your rig, camera, and omni antenna up to the site along with maybe a two meter HT for talk back. This way you can get a idea whether or not that site will do the job or find another. Note how well the more distant or non line of sight stations are received, and at the same time talk their picture in for strongest signal so they can mark it on their antenna rotator for when the machine goes up.

Other site considerations are what other repeaters, frequencies, and power levels are also there. You may find there are harmonic or intermods on the input frequency that could give trouble. Do the tests during high activity periods or even have the other site users make test transmissions while you are there. If the site is on government land you may have to apply for a special use permit from the responsible government agency. Usually the agency will circulate your request to all other site users giving a short period of time to reply with any objections. Don't worry about the off frequency overloads as the PSF-434-ATV interdigital filter should take care of them. The W6\*RC repeater is in the same building with 4 remote bases. The 434 mHz receive antenna is 15 ft. away from a 50 watt output FM remote on 448 mHz but you can't tell its on even with a weak 1 microvolt video signal input.

## ANTENNAS

The antennas and their placement is the second most important consideration for a successful repeater next to the site selection. Vertical polarization is used for repeaters for two reasons. The first is the availability of omnidirectional gain antennas thanks to commercial and amateur FM. Its much easier to get gain and omni direction in the vertical mode. The handbooks are full of them and their theory which we won't go into. The most popular is the Phelps Dodge PD-455 Station Master, with about 9 DB of gain. These are over \$200 apiece but are really worth it. If you have a small budget you might consider the AEA 450 Isopole which gives around 5 dbd gain for under \$100. All these antennas get their gain by compressing the vertical lobe with multiple elements phased on the same feed point. Also they are well decoupled from the coax



feed so that all the energy goes out on the horizon rather than tilted up into the air.

Horizontal omni antennas are a compromise of radiation efficiency to bend around dipole elements to get some sort of omni radiation. The vertical lobe must still be compressed to get the gain, so they usually take the form of many phased one above the other or special zig-zag. Broadcast UHF TV use them but they can afford the large arrays for the same gain. Attempts to properly phase many small beams usually end up with low gain main lobes and many nulls, but worst of all poor receiver to transmitter isolation.

Second, remember old demon desense and the 147 db requirement? Well each interdigital filter will give you at least 50 db each but the other 47 must come from antenna separation. Even more if you run higher power later. The null with two vertical omni gain antennas occurs when they are placed one directly above the other. According to Phelps Dodge, 20 ft. vertical separation will give 50 db at 450 mHz. However the same 50 db won't be had with horizontal separation until 400 ft. So the choice is either antennas, polarization, and placement for minimum radiation between omni antennas placed one above the other, or go split site with some link between.

### THE SIMPLEST ATV REPEATER SYSTEM

ATV and UHF are not really difficult and gear is available, but to be successful you have to be exact in your construction and components used. While you might be able to hear a ZL in New Zealand on 20 meters with only a clip lead to your bead springs, you may get lousy video if improper shortcuts are taken.

### TRANSMISSION LINES

At 450 mHz, a quarter wave length is only about 6 inches. If the coax does not stay 50 ohms along its length for as little as 1/4 inch, the resulting VSWR and loss is significant. For this reason much attention should be given to putting the coax connectors on properly. Again we mention the old demon desense, as it seems silly to put all the money into good filters and antennas and throw the hard earned db's away with poor connections, weatherproofing, and shielding. The transmission line must be as close to 100% shielded as possible. For this reason only good 50 ohm copper hardline or double shielded coax, such as RG214 or RG9 should be used all the way between the antennas and the filters. VSWR may radiate down the outside of the coax and couple into the receiving antenna, or even feed around the filter and get into other parts of the circuitry.

### FILTERS

Especially for inband repeaters or sites with other UHF FM machines, filters on both the transmitter and receiver are required. It's usually easily understood why a good filter must be put on the receiver, but every transmitter has some sideband harmonics and broadband noise that may fall into the receivers passband. Spectrum International designed a 5 active pole interdigital filter for ATV that meets the requirement of steep attenuation slopes or shape factor but has low inband ripple and loss over a 5 mHz bandwidth. It is a difficult filter to copy let alone tune without the aid of a network analyzer but some info on a similar 4 pole design can be found in the RSCB VHF-UHF Manual 3rd ed. Inband flatness is essential to insure that the phase of the color doesn't get shifted by the filter roll off. The color tint and hue can be changed if the

filter response is not correct. Early atv repeaters sacrificed good resolution, color, and sound because they had to use available cavity filters. But today with so many using color computers, cameras, and vcrs on ATV there is no reason, with the interdigital filter, to restrict the quality video to simplex.

In the case of the crossband repeater, the vestigial sideband interdigital filter is required on the receiver, but only a simpler, wider interdigital filter (PSF-1265) is required on the transmitter to kill what little subharmonics sidebands may get out of the varactor tripler. In fact the only difference between the diagramed inband repeater is the addition of the varactor tripler and its filter, and a homebrew version of the Phelps Dodge PD-455 made out of brass tubing for 1253 mHz.

### THE DOWNCONVERTER

Only good crystal controlled low noise downconverters should be considered for the repeater. We use the Spectrum International MMC439-ATV downconverter for example. A good point to remember is that you won't be there to give a fine tweak everytime something drifts. A temperature regulated site helps a lot, but even the best free running LO won't be good enough at temperature extremes from summer to winter. Also for this reason downconverting to the 45.75 mHz IF is suggested so that the VHF tuner drift won't enter into the picture. Signals from local commercial TV will probably be much stronger on the hill top site so using the IF instead of channel 3 will eliminate the possibility of strong channel 2 or 4 from riding in.

For proper system gain using the 45.75 mHz IF input, some of the VHF tuner gain must be made up for. So the selected downconverter must have at least 25 db of gain as well as a noise figure of less than 2 db. Too much gain may cause intermod interference if some of the out of band signals get thru the filter and overload the mixer. Again the downconverter must be completely shielded, capacitive feedthrus for power, and all coaxes must be double shielded. RG55 is a good small sized double shielded coax to use between the filter and the downconverter. The LO has to be on the high side so as to invert the desired USB to LSB passband found in TV sets. If channel 3 is used then the LO must be on the low side as the vhf tuner will invert it.

### TV RECEIVER

A good portable AC/12VDC TV is usually used for the receiver because the monitor is essentially free and is one less piece of gear to haul up to the site for testing or adjustment, and its ready to go at relatively low cost. Today many TVs have video and audio inputs and outputs built in to mate up with VCRs which means no video buffers and digging into the TV circuitry is necessary to bring them out. Also if these outputs are built in, the manufacturer had to have paid more attention to the IF alignment in order to get good color response on the monitor output.

The Liberty model 5010 shown in the block diagram is a 5 inch color portable, available from P.C. Electronics, which lends itself nicely to mounting in a 7 inch high rack panel. But the selected TV does not have to be a color set to pass color. A black and white set will work fine but will probably have to have its IF response re-tweaked for a flat 4 mHz response. This will also be true if any other IF strip module is used. Which ever set you select, get a service manual on it so that you can properly adjust the right tuned circuits and traps for the best resolution and color response.



If the set doesn't have a video output, one can be added usually with a P.C. Electronics VA-2 Video Distribution amp connected just after the video detector. Most TV schematics show a scope video test point with a wave form between .5 and 2 volts peak to peak. Note whether or not the sync is negative going or positive going at that point and jumper the phase on the VA-2 accordingly, and then adjust its gain pot for 1 volt peak to peak into a 75 ohm load. Place the VA-2 as close to the tap point as possible to minimize any flyback transformer radiation from being picked up on the input. Bringing the video out thru a 75 ohm cable to connect to the sync operated relay that turns on the repeater, and to the transmitter or other special effects boards that might be added later.

Make sure that the set uses a power transformer and is not hot to the AC line. Hot chassis sets can be used but will require a AC isolation transformer so that smoke will not rise when any ground connection is made to the chassis or your hair strand straight out when you touch it.

If channel 3 is used, connect the 75 ohm coax from the downconverter directly to the antenna input of the VHF tuner. Do not just run it thru a balun to the twin lead screw terminals on the back. The internal twin lead from the back panel to the tuner is too much of an antenna for possibly picking up interference from strong channel 2 or 4 stations. If the VHF tuner has a balun on it, remove it and connect the coax directly to its output as it goes into the tuner.

To use the 45.75 mHz IF for the downconverter input, find the lead between the VHF tuner and the IF input, break it and connect the 75 ohm coax from the downconverter to that point. Most TVs made for portable use (actual portable on batteries or plugged into 12 volt systems in cars and RVs, not just because it has a handle on it) have better sensitivity and plenty of gain so that the 25 db of gain in the downconverter is sufficient. But if it is not, a single stage amp at 45.75 mHz such as the Advanced Receiver Research PCH45VD can be add to make up for it rather than risk intermod with a 450 preamp. At this point, have another station transmit a good snow free color picture to you. Connect up on the bench the filter, downconverter, and TV plus your station atv antenna. Look at the monitor output on a scope and see if the color burst on the back porch of the horizontal sync is about .3 volts peak to peak when the total fully modulated video output waveform is 1.0 volts p-p. If not then there may be some roll off somewhere in the system that needs adjustment. Don't worry about the 4.5 mHz sound subcarrier level being down, in most TV sets its purposely rolled off in the IF 15 to 20 DB and finally trapped out in the video amp to prevent any intermod beat between it and the color subcarrier.

The sound may be rolled off 20 db in the IF but the sensitivity is about equal to the video due to the narrower bandwidth in the sound IF. In theory anyway, but here again poor IF alignment at the factory can result in one TV having fine sound with 30% snow and another barely audible with 10% snow. One other factor on simplex is that we run double sideband and depending on the alignment again, if both sidebands arrive at the sound IF limiter within 6 db of each other and out of phase, there may be some cancellation. This is not a problem with the repeater receiver because the interdigital filter drops the LSB sound subcarrier about 40 db or more.

Adding an interdigital filter at the home station is a little expensive. A much easier cure is to either check the TV IF alignment or add a simple series tuned suckout circuit at the video IF input tuned to 50.25 mHz. This can consist of a .47 microhenry inductor in series to ground with a trimmer cap or combination trimmer cap and fixed cap to give the total capacity of 21 PF. The inductor can be made from winding 12

turns of #24 wire on a 1/4" drill 3/8" long. The caps can be a 1-10 pf variable in parallel with a 15 pf silver mica. Start at minimum capacity, and slowly tune down until the sound improves on a weak signal. If you go too far the video will be affected. Another method is to use a grid dipper and a counter for precise setting.

Sound out of a TV with audio output is usually around 1 volt p-p into 10K and is independent of the volume control. This is fine for the repeater and no further modifications or adjustments are necessary to the set. If there is no audio output, you will have to consult the service manual schematic for a point to tap into for a level of .1 to 1 volt. If the TV uses a DC volume control that is part of the sound IF chip then you will have to adjust the volume control for a adequate level for the repeater and put a speaker L pad between the TV and its internal speaker to be able to turn the speaker down when you leave the site. One other consideration is the de-emphasis network. This is usually found close to the sound detector output and therefore before the point you will tap. The curve for TV is 75 microseconds which has little affect on voice response unlike FM communications which starts at 300 Hz. So while tapping in before or after won't make much difference to the voice response, it will give more high frequency hiss and noise if the tap is before the de-emphasis RC filter.

Some sets seem to have more intercarrier sound buzz than others, and this again is due to poor alignment at the factory. Make sure the discriminator balance or quadrature detector is right on 4.5 mHz tuned circuits in the sound IF circuit. When there is over modulation or lots of white in the picture, the sound IF limiters may go in and out of limiting at the picture scan rates which give the resulting buzz. Since the white level is the lowest power swing of the video, the limiters need to have all the signal they can get to level off the AM variations.

Most will not have a scope and TV sweep gen to do a accurate alignment. What you might do is to get all the local atvers together with one of the local TV repair shops, especially if the owner is a ham, and have a alignment party on the weekend. You may have to pay for his shop time, but with the whole group there to watch and pick his brain, it will be well worth it.

## SYNC OPERATED RELAY

The repeater should key up only in the presence of video and not from, FM, radar, etc. that kicks up the AGC. To do this a PLL 567 decoder is used to detect the 15734 Hz horizontal sync. When the horizontal sync is detected, the DPDT relay will pull in. The relay contacts control the application of regulated 13.8 VDC to the transmitter. The output of the 567 is a series of spikes at the 15 kHz rate for a short duration upon application of a video waveform. To keep the output from chattering, some hysteresis is added to give a little keyup and dropout delay. This smooths out the keyup and gives some more noise immunity.

The P.C. Electronics TD-1 Tone Decoder board uses available Radio Shack parts. Later on a fancier sync operated relay with provision for time limits, test patterns, video IDs, etc can be added, but this should be done only after all the bugs are out of the basic repeater and its had at least 6 continuous weeks of unattended operation with no problems.

## REPEATER TRANSMITTER MODULE

The P.C. Electronics RTX-1 is made up of atv modules mounted in a Hammond 1590D die cast aluminum box measuring 7.3x4.7x2.0 inches. Bud also makes a equivalent.



These boxes are very tight RF wise and also are a good heat sink. All the power and signal leads come out thru 500 pf ceramic feedthru caps. This tight box is necessary again to prevent leakage RF from getting to the receiver. I mounted the RTX-1 transmitter module in a 3x12x15 aluminum chassis along with the sync operated relay and 3 amp power supply. There is plenty of room left over for later additions. The chassis is attached to a 3.5" 19 inch rack panel for mounting. The RTX-1 bottom is covered with silicon heat sink compound before mounting to the aluminum chassis to make sure the heat is conducted out.

A 1" diameter hole can be punched in the back of the chassis to allow access to the RF output BNC connector. A short RG55 double shielded 50 ohm coax is run from this output to the PSF-421-ATV vestigial sideband filter. In the case of the crossband repeater it will go to the MMV-1253 varactor tripler and then thru another piece of RG55 to the PSF-1253 interdigital bandpass filter. The filters take BNC connectors so use only good constant impedance one step adaptors to transition to the larger coax or hardline.

Also along the back of the chassis you can put RCA jacks for the TV audio input and its 10K level pot, as well as up to 3 other future audio inputs such as 2 meter FM simplex used for talkback (usually 146.43 or 147.51 MHz), MCW call IDer, weather radio, etc. The minimum audio level into these inputs is .2 volts p-p into 10K for full 25 kHz deviation. The 10 pots allow independant mixed levels. Usually the TV audio is set for full 25 kHz deviation and the others down 10 db or so as not to drown out the incoming audio but enough to be heard.

The video from the TV monitor output can be put on the front panel or rear depending on how you want to route it from the TV, or special effects card cage later. Although once the modulation pot on the TXA5 exciter/modulator has been set with a 1 volt p-p video signal, all feeds should be adjusted for that level rather than trying to readjust everytime a new piece of gear is added.

The DM-1 monitor output is optional if you are building your own from modules, but is really handy for setting levels out of the transmitter with a scope and a video monitor. A mic jack on the front panel will also give you duplex audio while making adjustments at the repeater site. It mixes with the other audios that go to the FMA5 subcarrier gen. Don't forget and leave it plugged in when you leave the site or you will hear every cricket in the county that night!

The power supply is made up from Radio Shack parts. The LM350K or LM350T adjustable regulator can also be mounted on the back of the chassis with a mica spacer and heat sink compound. A center off dpst toggle switch provides the mode switching to enable easy testing at the site. It can be switched for constant transmit or receive only as well as normal repeat mode.



PUBLISHERS NOTE-This information was taken from Chapter 11 of the "Everything You Always Wanted To Know About ATV" but were afraid to ask" manual; revised 3rd edition. This 112 page ATV handbook may be obtained for \$9.95 plus \$1.50 postage from QCD Publications, Inc. PO Box H, Lowden, Iowa 52255. Since this printing, a few updates in technology have been made. 1. Antennas-Hustler Company has come out with a new G6-440 18 Mhz. wide Vertical Ground Plane (see A5 October 1984 Vol. 14 No. 10 issue). There have been several semi-omnidirectional designs published for those residing in horizontally polarized areas including using small wide beamwidth beam antennas fed in phase at 60 degree angles. 2. Filters-For further ATV filter information call John Beanland 638VU/W1 at (617) 263-2145. 3. TV's-Liberty Model 5812 (video out) TV's can be obtained from Far East International (QCD Marketing Services). 4. Feedlines-Belden 9913 outperforms 8214 at about the same price (see A5 November 84 Vol. 14 No. 11 issue). 5. Sync Operated Relay-PC Electronics has a new "VOR" video operated relay circuit board now used in the RTX series Repeater Transmitters. The author Tom O'hara W6ORG can be reached via P.C. Electronics, 2522 Paxson Lane, Arcadia, California 91806 (818) 447-4565.

Channel 17

The P.C. Electronics TXA5, MHW710-2 power module, FMA5, and DM-1 are shown elsewhere in this book and are shown as blocks connected by RG 174 50 ohm coax inside the die cast aluminum box.

## WHISTLES AND BELLS

Getting it all working and installed will take some time but the reward of seeing a good RF system reliably operating will be worth it. Do not be tempted to add amplifiers, IDs, etc. until the basic RF system is up and running for a while. If you do you might be overwhelmed by too many system problems and interactions to properly trouble shoot them. One step at a time will pay off in the long run. There have been many with great ideas for a machine who end up many dollars and years later with nothing but a rack full of junk that is poorly functional at best.

Adding video or audio functions and effects is now as easy as unplugging the shielded cables between the TV and the transmitter panel, and looping them thru the effects card cage or chassis. If it doesn't work quite right when you get it up at the site, then just re-plug in the two cables to the transmitter rack, take the effects module home to trouble shoot and try again next week. But you will not catch hell from the local users for being down in the mean time. The joys of being a repeater owner are another story all together.

Once up and running the possibilities are endless. Here are a few to get your thinking cap dreaming:

Computer games. Use the sound subcarrier for RTTY, ASCII, or cassette interface from users keyboards or TTYs to access the computer at the site to come over the repeater output.

Weather watch. Key on with touch tones on the sound subcarrier the local weather watch or GOES weather satellite video on the repeater output. VHF weather can also be keyed on to the sound subcarrier.

The CBG-3 color bar and pattern gen can be keyed in to give test patterns for TV alignment and tests. It can also be set to come on for a minute or two automatically after a station unkeys. Time, call ID, and relative signal strength can also be automatically superimposed on the test pattern with the VDM-3, VID-3, and other boards.

All kinds of audios can be switched in and out, including a MCW ID at the beginning of each key up. The two meter talk back is very handy for duplex audio with the station you are working. If he is out of 2 meter range but can see the repeater, then its like having a remote 2 meter receiver on the hill top that enables you to hear his comments on your video while you are on and talking to him on the sound subcarrier.

I could go on and on, but you get the picture?

W6ORG (c) 3/82  
Tom O'Hara



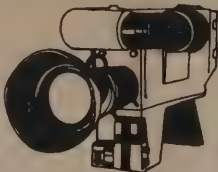
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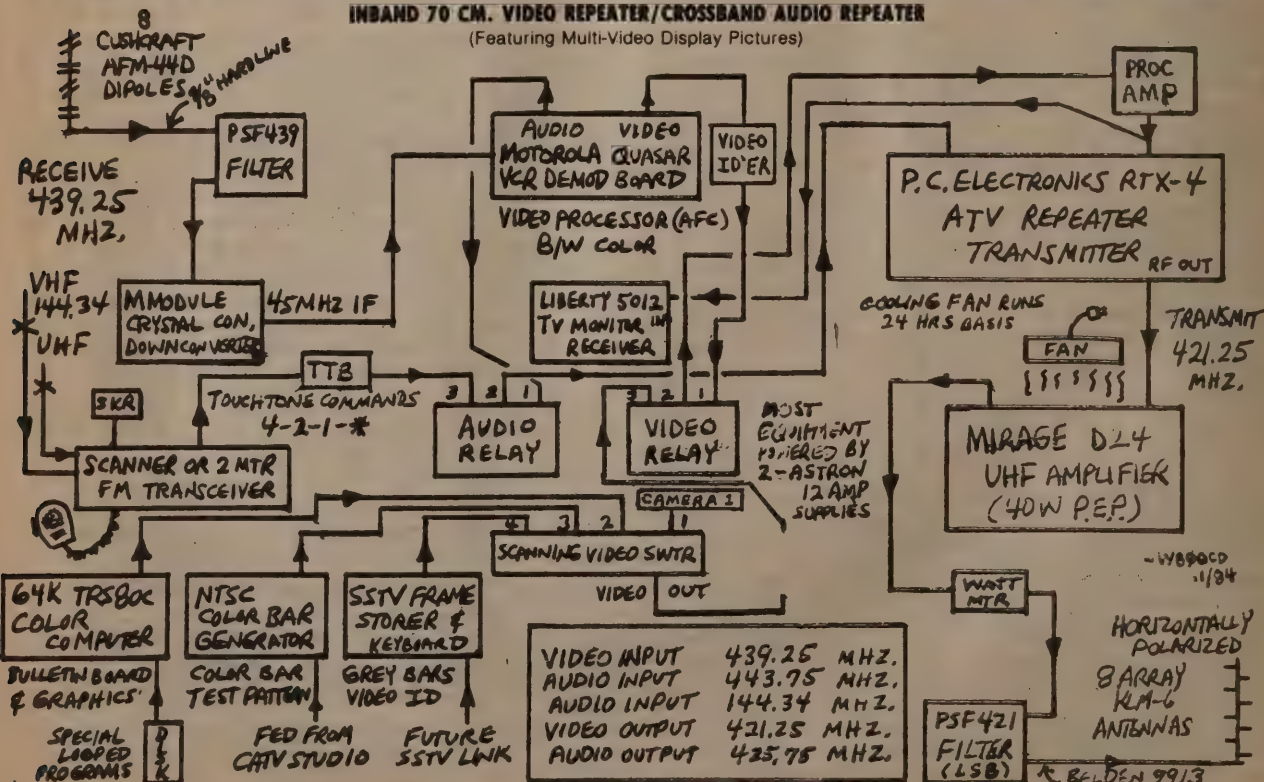
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Channel 18



# MIDWEST N9CAI/R ATV REPEATER-REMOTE TRANSMITTER IS UNIQUE!

## HORIZONTALLY POLARIZED SYSTEM FEATURES COMPUTERIZED DISPLAYS AND CROSSBAND AUDIO RELAYS

Members of the Quad-City based (Davenport, Bettendorf, Iowa/Rock Island and Moline, Illinois) "ILLINOIS ATV GROUP" have something to be really proud of! A relatively new group of ATV'ers (4 years), the Group decided to finance and build a REMOTE CONTROLLED UHF FAST SCAN TV TRANSMITTER that could be touchtone accessed on their local 2 Meter simplex FM frequency of 144.340 Mhz. It was the first such system known in the bordering states. A Repeater Committee was formed to carry out the needed work consisting of N9CAI, WD4WYA, WB0QCD, N9AEP and KA0BJT. WB0QCD funded a large share of the project up front, eventually to be repaid as time and finances allowed. Several members of the initial ATV group donated from \$20 to \$50 per person to obtain the basic equipment. Some pieces of needed gear were also "loaned" to the unique project. There are 20 "paid" members with about 30 active ATV'ers in a 40 mile radius.

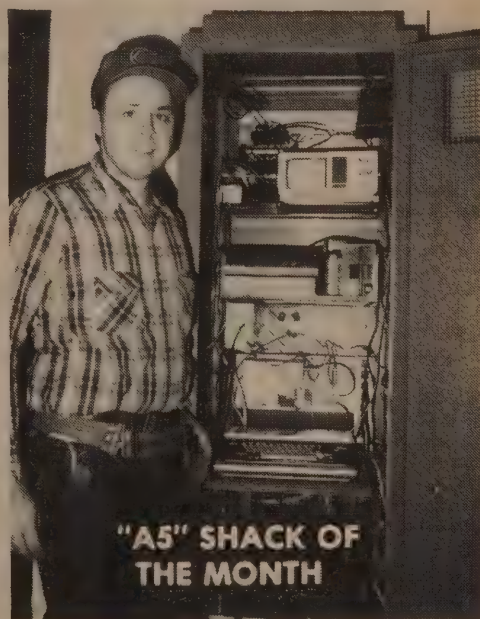
At first, a SILVERMAIL ATV component system from Florida was constructed. Downconverter, Exciter, Amplifier and Sub-Carrier sound boards were interfaced. A Motorola Quasar VCR front end circuit board was obtained to regenerate the video signal in place of the usual TV set. The first antenna used was a horizontally polarized SENCON T432 turnstile antenna mounted at 70 feet atop a 3 story school building at St. Ambrose College in Davenport, Iowa. 90 feet of Andrews 7/8 inch hardline kept signal loss to a minimum. A cheap B/W Camera was focused on a test pattern display and later to a "live" moving ID/Clock. N9AEP homebrewed and interfaced the touchtone control circuitry. The site is one of the highest areas for several miles and provides excellent all around coverage. Winter of 1983 set in with some disappointing erratic transmitter RF power component failures. The system was "up and down" for several months. The decision was made by WB0QCD to purchase a new PC ELECTRONICS RTX-4 (Kreepie Peepie) Repeater Transmitter package in April at Dayton 1984. The demonstrator model prototype shown by Tom O'hara W6ORG at his booth in Dayton was purchased and brought back for a demonstration to members of the "ILL/IOVA ATV GROUP. Members liked what they saw and approved immediate funding for the unit. The PC ELECTRONICS RTX-4 unit has since performed flawlessly now for 9 months without any component failures or problems. The unit meets or exceeds all claimed specifications and is recommended highly.

During the spring of 1984, further work began on the N9CAI system to upgrade it to an additional UHF to UHF audio relay repeater as well. A Bearcat 101 Scanner was added to the system which began repeating 2 Meter audio out thru the FSTV Audio Subcarrier frequency. A 64K TRS80C Color Computer with Disk Driven looped programs (including an ATV Bulletin Board Message Center) was interfaced to the RTX-4 video input replacing the B/W Camera. The system was now providing several functions as well as sending a mixture of interesting ATV graphic pictures. In November, further work was completed for actual ATV video signal "repeating" with the installation of a (Microwave Module) crystal controlled (45 Mhz. IF) receive downconverter, input and output

interdigital copper bandpass filters (PSF421/439 from Spectrum International), extended touchtone circuitry relay capabilities and the installed Motorola VCR demodulator TV board. A 5" Model #5012 Liberty Color TV Set was also added to "monitor" incoming and outgoing ATV signals as well as the TRS80C's computer's display. A separate, horizontally polarized, semi-omni directional pattern, 8 array, co-phased KLM-6 element beam system was installed as the transmitting antenna system (see other "A5" article on this). "Live" FSTV signals began repeating just before the Thanksgiving holidays.

**SPECIFICS**-Any video sync ATV signal on 439.25 Mhz. automatically turns on the inband 421.25 Mhz. N9CAI/R transmitter through the VOR relay onboard the RTX-4 unit. Inputted FM Audio Subcarrier is also relayed out on 425.75 Mhz. The transmitter drops when the entered sync signal drops. Touchtones 4-2-1-W brings up the computerized ATV REMOTE TRANSMITTER mode position and always takes precedent over "live" FSTV signals. Using a four channel, automatic scan select video switcher, screen displays are alternated between the computer, fed NTSC Color Bars and Video ID Generators. Timers allow appropriate view times with a built-in 10 minute automatic transmitter dropout limit (No timeout limit exists in the live FSTV mode). Audio from 2 Meters is repeated out on 425.75 Mhz.

Since the entire ATV Relay System is "horizontally polarized", no user had to change or add more antennas. Maximum useable range of operation under normal operation (50-100 watts and good gain required) is around 40 miles. More information may be obtained by requesting the "ILL/IOVA ATV Group, Winter Edition 84 SYNC BU22 Newsletter".



TRACY MONSON N9AEP CHIEF ENGINEER  
AT N9CAI ATV REPEATER SITE



# AMATEUR TELEVISION

NOW MORE STANDARD FEATURES . . . STILL **\$399** DELIVERED  
TWO FOR \$750

## ALL YOU NEED IN ONE BOX



BUY THE MOST  
POPULAR ATV  
TRANSMITTER/  
DOWNCONVERTER

## TC-1 PLUS

SEE WHO YOU ARE TALKING TO! Show the shack, describe projects, run video tapes, computer programs, etc . . . in full color, sound, and in live action.

### STANDARD FEATURES:

- **OVER 10 WATTS PEP RF OUTPUT.** Crystal controlled continuous duty transmitter. Specify 439.25, 434.0, 426.25 standard or other 70 cm freq. 2 freq option add \$26.
- **BASE, MOBILE, or PORTABLE.** Use the builtin AC supply or external 13.8 vdc at 3 amps.
- **TWO VIDEO AND AUDIO INPUTS** for camera, VCR, or computer. Wide bandwidth for high resolution broadcast quality color video or computer graphics. Standard broadcast sub-carrier sound which is heard thru the TV speaker. On-carrier audio optional at \$40.
- **RECEIVE ON YOUR STANDARD TV SET** tuned to channel 3 or 4. Sensitive varicap tuned downconverter covers simplex and repeater freq over the whole 420-450 MHz 70 cm amateur band. Low noise NE64535 preamp stage.
- **VIDEO MONITOR OUTPUT** of your transmitted picture makes video gain, lighting, etc. adjustments easy & accurate.
- **ATTRACTIVE 10½ x 3 x 9** aluminum cabinet with woodgrain covering, and special aquadag conductive coating inside for full shielding.

### SO WHAT ELSE DOES IT TAKE TO GET ON ATV?

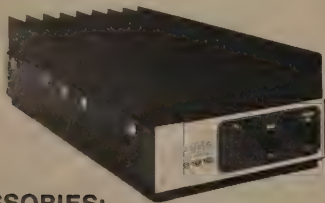
The antenna is really the secret to success with ATV. We suggest the KLM 440-27 Beam antenna with its high 14 dbd gain and wide bandwidth, and some of our Saxton 8285 low loss coax between it and the TC-1+. Antenna height at or above the tree tops makes a big difference. Line of sight DX is about 40 miles.

Any standard TV set is used as the receiver. The TC-1+ downconverts the 70 cm ham band down to channel 3 or 4. Just connect a short coax from the TC-1+ to the TV sets antenna input.

Any source of standard 1 volt composite video, such as is found in portable color or black and white cameras, VCRs, or computers can be plugged into the TC-1+ and transmitted to another station. Repeat SSTV to local ATVers. Audio can be from a low Z dynamic mic, or line level from cameras, VCRs, computers, etc.

Its really quite simple to have your own TV station capable of sending and receiving video 15 to 100 miles and more. DX with this set up is similar to 2 meter FM with omni antennas.

**THATS IT! It's easy!**



### ACCESSORIES:

Mirage D1010N 100 watt pep all mode amp .....	\$298 del.
450 AEA Isopole omni antenna .....	\$65 del.
Saxton 8285 low loss 50 ohm coax, 100 ft. ....	\$41 del.
KLM 440-27 14dbd 70cm beam antenna .....	\$89 del.

If you wish to build your own system, see module page. The TC-1+ contains the TXA5, PA5, FMA5, TVC-2L, & DM-1 module functions.

Tech class or higher license required for purchase. Normal shipment within 2 days on charge card or postal money order.

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**TOM W6ORG MARYANN WB6YSS** B-84

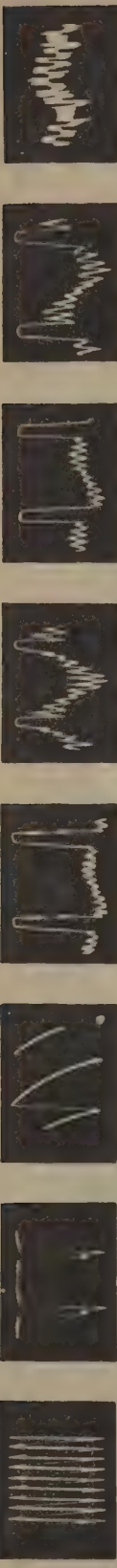
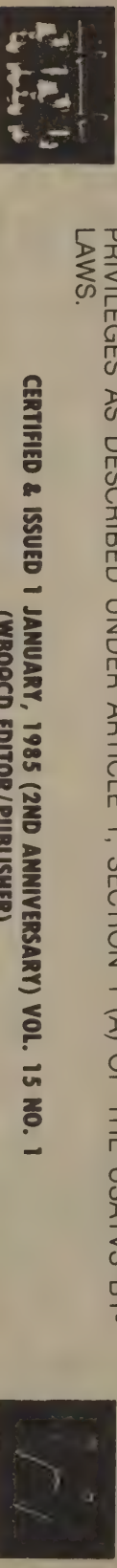
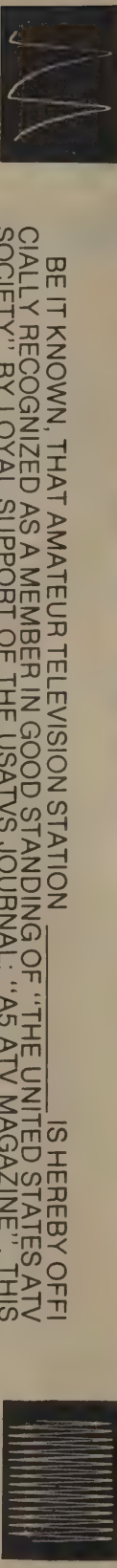
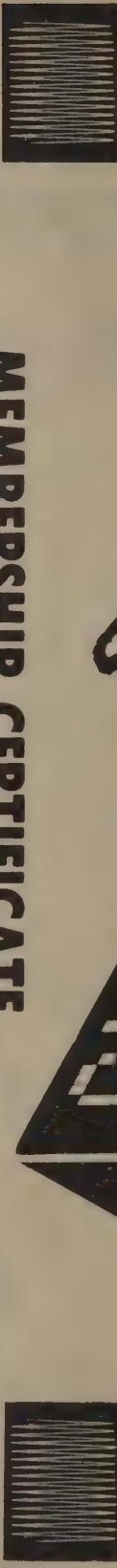
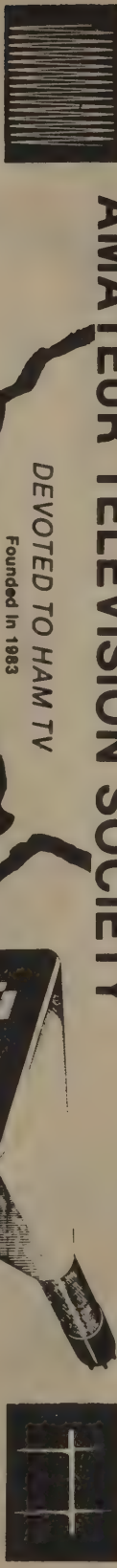
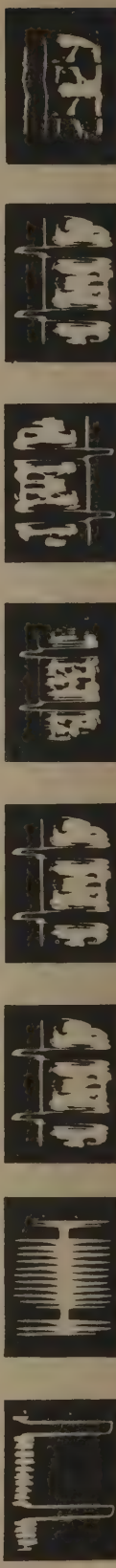
**TELEX 380172**



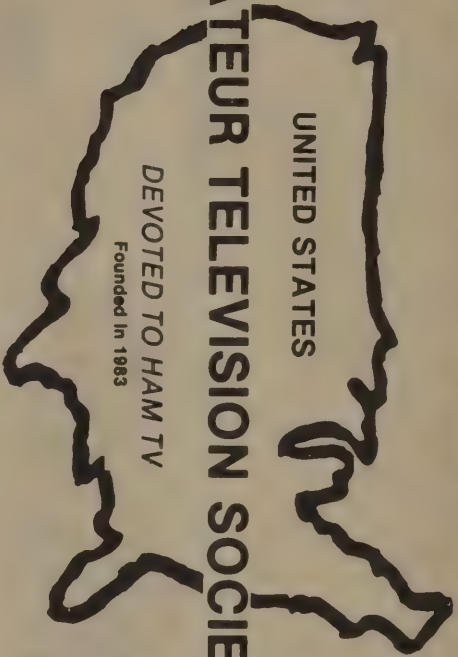




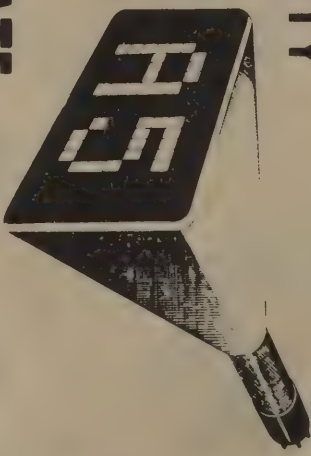




# AMATEUR TELEVISION SOCIETY



Founded in 1963



AMATEUR  
TELEVISION  
MAGAZINE™  
SINCE 1967

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BE IT KNOWN, THAT AMATEUR TELEVISION STATION \_\_\_\_\_ IS HEREBY OFFICIALLY RECOGNIZED AS A MEMBER IN GOOD STANDING OF "THE UNITED STATES ATV SOCIETY" BY LOYAL SUPPORT OF THE USATVS JOURNAL: "AS ATV MAGAZINE". THIS ATV STATION PROMOTES THE HAM-TV MODES OF AMATEUR RADIO SPECIALIZED COMMUNICATIONS. THE BEARER OF THIS CERTIFICATE IS AWARDED ALL RIGHTS AND PRIVILEGES AS DESCRIBED UNDER ARTICLE 1, SECTION 1 (A) OF THE USATVS BY-LAWS.

CERTIFIED & ISSUED 1 JANUARY, 1985 (2ND ANNIVERSARY) VOL. 15 NO. 1  
(WBOQCD EDITOR/PUBLISHER)



# Build Your Own ATV Station With These Few Modules

## The Basic 3 Transmitting Modules (buy all 3 save \$8) ... \$199



TXA5-5



PA5



FMA5

All modules can be run from a 3 amp 13.8 vdc regulated power supply. A good UHF T/R relay should be used, we stock the Magnacraft W120X-14 at \$44 delivered. The modules should be mounted in an aluminum chassis or cabinet for heat sinking and shielding. See chapter 14 of 1984 ARRL Handbook.

### 1. TXA5-5 ATV EXCITER/MODULATOR ..... \$89 del

Wired and tested module provides 80 mw to drive PA5 10 watt power amp. High/low power switch for normal 10 watts with PA5, or adjustable for high power amps such as Mirage D1010N. Accepts standard 1 volt composite video from color camera, VCR, computer, etc. Wideband modulator gives excellent color and high resolution. Built in sync expander. Draws 70 ma at 13.8 vdc. One crystal included, but 2 freq requires another crystal at \$15. We stock 439.25, 434.0, & 426.25 mHz, other 70 cm freq may take 3 weeks. CA-2 on-carrier audio module single freq, add \$40. Two frequency \$55.

### 2. PA5 10 WATT PEP ATV POWER MODULE ..... \$89 del

A Motorola MHW-710-2 is mounted on a heat sink with stripline PC board to give over 10 watts pep video when driven by the TXA5. 50 ohms in and out. Broadband, covers the entire 420-450 mHz 70 cm band with no tuning. Draws a little over 2 amps at 13.8 vdc reg.

### 3. FMA5 AUDIO SUBCARRIER GENERATOR ..... \$29 del

Transmits broadcast standard sound with your picture. Accepts a low Z mic (100-600 ohms), also line level audio from VCRs, camera mics, computers, etc. Up to 1 v p-p drive to the TXA5, VM-2, or VM-4 modulators. Works with any transmitter with 5 mHz modulation bandwidth. Draws 20 ma from 13.8 vdc supply.

## 420-450 mHz ATV RECEIVING DOWNCONVERTERS



TVC-2



TVC-2G



TVC-4

### TVC-2 ATV DOWNCONVERTER ..... \$49 delivered

Wired and tested module connects between 70 cm antenna and TV set tuned to channel 2,3, or 4. Varicap tunes the whole 420-450 mHz amateur band. Sensitive MRF901 preamp, stage digs out the weak ones and the hot carrier double balanced mixer resists intermoda and overload. Requires +11 to 18 vdc at 20 ma.

### TVC-2L more sensitive with NE64535 preamp stage ..... \$59 del

### TVC-2G most sensitive with GaAsFet (.5db NF) stage ..... \$79 del

It can be mounted in the shack, but is designed for antenna mounting for best sensitivity (Besides low noise figure, you gain the feedline loss). Has extra double tuned bandpass filter to reject strong UHF TV stations.

### DCB DOWNCONVERTER CONTROL BOX ..... \$59 del

Provides variable 10 to 18 vdc thru coax to antenna mounted downconverters such as TVC-2G and TVC-12G. Also has 15 db gain line amp to drive long lines or splitters. Ready to go, comes in same cabinet as TVC-4.

### TVC-4 PACKAGED DOWNCONVERTER with AC supply... \$89 del

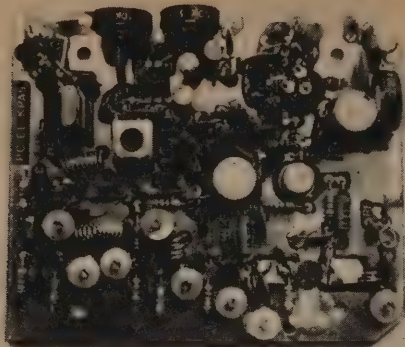
Contains the TVC-2, 120 vac supply, ready to go. BNC antenna in/out and F connector TV output. Handy for ATV demos, or community TV systems outside of the USA. Size is 5.3 x 2.5 x 7 inches.

### TVC-4L contains the more sensitive TVC-2L ..... \$99 del

\*Attention clubs, groups and exporters ..... the following quantity discounts apply to one module ordered at one time and sent to one address: 5-24 10%, 25-49 15%, 50-99 20%, 100-up 25%.



# THE "KREEPIE PEEPIE" ATV TRANSMITTER IS HERE!



## KPA5 1 WATT ATV TRANSMITTER BOARD FEATURES:

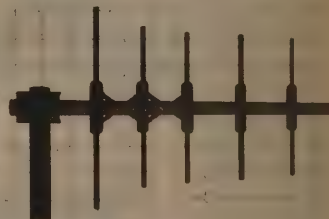
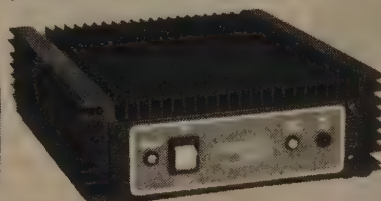
- ★ 1 watt pep minimum RF output on sync tip.
- ★ Full color and sound on one small 3.25 x 4" board.
- ★ Composite video input from camera, VCR, etc.
- ★ Runs on external 13.8 vdc at 300 ma supply or battery.
- ★ Wired and tested board covers 421 to 439 mHz.
- ★ Supplied with one xtal on 426.25, 434.0, or 439.25 mHz but capable of 2 freq operation with the addition of 2nd xtal (add \$15). Other 70cm freq. available on special order.
- ★ Mic input from a low Z dynamic and line level audio input found in most portable color cameras, VCRs, or home computers provided.
- ★ Schematic and application notes supplied for typical external connections, packaging, and system operation.
- ★ Price delivered via UPS surface in the USA is only **\$159**. Technician class amateur license or higher required for purchase and operation.



## DO SOME OF THESE APPLICATIONS INTRIGUE YOU?

1. **PORTABLE CORDLESS TV CAMERA.** No heavy VCR to lug around or cable length limitation. You can even use your home VCR rather than a portapak. Now you can creep around and peep thru your camera more easily. Gives good pictures up to a mile with simple whip, and 40 miles using beams in flat terrain.
2. **MOBILE OR PORTABLE ATV for public service events** such as races, parades, marathons, etc. A Mirage D24 40 watt amp can be added for greater mobile coverage or base operation. Mount in an airplane for CAP and rescue searches for an eye in the sky.
3. **REMOTE CONTROL OF R/C AIRPLANES or ROBOTS.** Fly with a camera in the nose to control as if you are in the plane. Likewise a robot can now be out of site of the operator.
4. **REPEATER SITE SECURITY OR COMPUTER VIDEO DISPLAY.** Turn on thru your repeater a camera at the site to see the area, weather, read meters, or if a computer is used, show status, play games, etc. by remote control. With all the new technology using TV displays, it is natural for hams to adapt these new products to transmission over the air. What applications come to your mind?

**WHAT IS REQUIRED FOR A COMPLETE OPERATION SYSTEM?** A TV set with a TVC-2 or TVC-4 420-450 mHz to channel 3 downconverter, 70 cm antenna, and coax cable to receive. Package up the KPA5, add 12 to 14 vdc, antenna, and any tv camera, VCR, or computer with a composite video output. Simple, eh?



## ACCESSORIES:

Downconverter: TVC-2 wired & tested board ..... \$49  
 Varicap tuned. Requires +11 to +18 vdc at 20 ma.  
 TVC-4 (TVC-2 in cabinet with ac supply ..... \$89  
 more sensitive "L" versions with NE64535 preamp  
 stage add \$10.

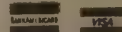
Mirage D24 1 in / 40 watts out all mode amp. .... \$179  
 450 ISPOLE omni gain 70cm antenna ..... \$65  
 KLM 440-6 8 dbd gain 60° beamwidth antenna .... \$38  
 KLM 440-27 14.5 dbd gain broadband 70cm antenna ... \$89  
 100' roll Saxton 8285 50 ohm low loss coax ..... \$41  
 VOR Video Operated Relay board ..... \$25  
 800J 10 pin Fem. Color Cam. Chassis Connector. .... \$10

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# TVG 12A 23 CM ATV TEST GEN

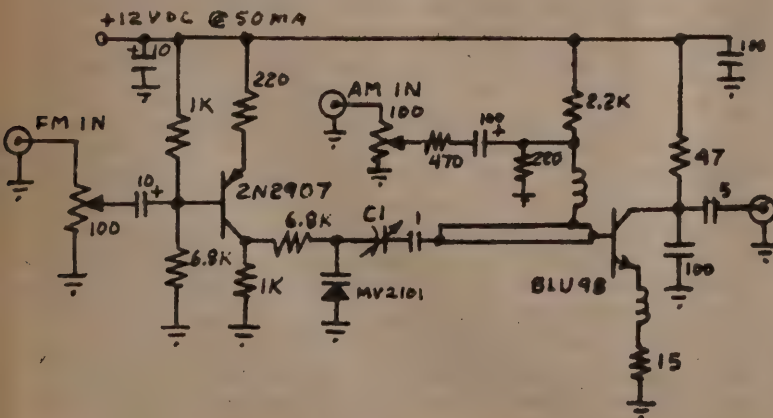
The TVG-12A is a simple 50 mw 23 cm (1240-1300 MHz) AM or FM modulated oscillator designed to be an inexpensive signal source for testing preamps, downconverters, antennas, or as a short range transmitter for demos, links, and remote monitoring.

The 23 cm ATV test gen comes tuned to approximately 1265 mHz. If there is 23 cm activity in your area care must be taken to set the frequency away from other band users if it is to be used as a transmitter. The frequency can shift a few mHz from stray capacity to the chassis or other objects, antenna loading, and poor voltage regulation. Use a good regulated +12 to 13.8 vdc at 50 ma power supply. The frequency can be set with a insulated tuning tool applied to C1. Do not adjust the frequency unless you have a receiver or other calibrated reference to make sure that you are inside the band.

Check the various handbooks for 23" cm antennas if the gen is to be used on the air. A simple ground plane can be made using a 2.2" long quarter wave whip for close in work such as demos; etc. For antenna tests, separate the source antenna from the test antenna by at least 15 feet, and use an open area. As a sig gen for tuning up converters and preamps, use fixed and variable coax attenuators to reduce the signal to useable low levels. Make direct coax connections rather than with antennas to minimize signal variations from multipath around the room when tuning.

There are 2 inputs, one for FM and the other for AM modulation. Either will accept a nominal 1 volt peak to peak into 75 ohms of video or audio. The modulation depth or deviation is set by the corresponding 100 ohm pot. FM deviation is wideband up to 10 MHz. A dpdt center off switch may be used to turn the test gen on as well as select the type of modulation from a single input connector.

To minimize multipath signal nulls from stray radiation, place the TVG-12a in a tightly shielded enclosure (Hammond 1590B is suggested). Run the +12vdc lead thru a .001 feedthru cap. A RCA jack can be used for the video input. Direct connection between the threaded end of a UG1094 BNC chassis connector & the board ground plane for the RF output is important. The center pin of the BNC can then be connected to the board RF output with a short piece of buss wire. Layout the enclosure carefully and test fit the connector and board before tightening the BNC nut and soldering together. If the BNC shell end is soldered to the ground plane at the boards edge, then the board need only be supported with 2 screws on the opposite side. An easy mounting method is to use 4-40 x 1/2" screws with a lock washer and double nuts for spacing the board above the enclosure floor.



**Tech class or higher license required**



# FURTHER TESTS CONDUCTED TOWARD

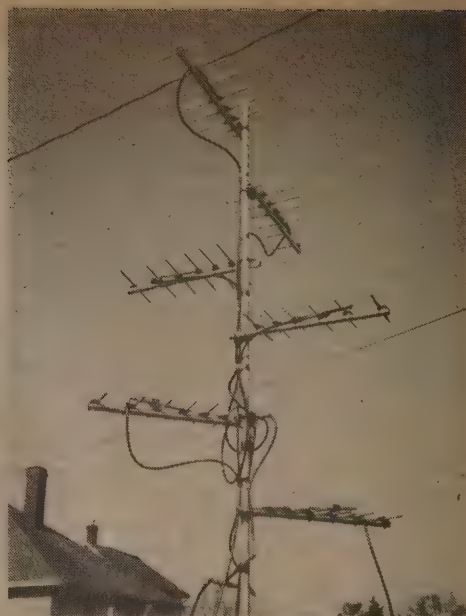
## THE SEARCH FOR OMNI-DIRECTIONAL HORIZONTALLY POLARIZED ANTENNA SYSTEM

SIX KLM-440-6 ELEMENT BEAMS TESTED  
"ILLIOWA ATV GROUP REPORT UPDATE"

PART TWO by WBØQCD

After several studies and publishment of findings of antenna polarizations for Fast Scan Television groups here in the USA, it was determined that most of the country utilizes the "horizontal" mode antenna radiation pattern. Horizontal polarization is most popular from the Rocky Mountain states, throughout the midwest and most of the eastern states. The vertical polarization antenna mode is predominant in California, parts of Arizona, and some segments in Texas, Indiana, Kentucky and Florida. Several metropolitan ATV active areas (Indianapolis, Owensboro, New York, Minneapolis-St. Paul, Cedar Rapids, for example) formerly favored the horizontal mode, but when a repeater project came along, switched to vertical polarization. The "switching" of antenna polarization modes and to follow, several years of personal hardships and ill feelings by some who were forced to additionally "switch" nodes, has been the subject of past articles and editorials and shall not be debated here in this report. It is mentioned only as "preface for reason" for justification toward the continuing work toward alternative methods for those already using and desiring to remain in the "horizontal antenna mode" and yet still erect an ATV Repeater or Remote Transmitting facility with "omni-direction" capability.

Several articles have been published in The USATVS Journal regarding various types of homebrew omni-directional or at least semi omni-directional horizontally polarized antennas. There have been in the past 2 years, even designs successfully tried and in use today of slightly modified, economical commercial antennas for the same purpose (see "AS" Master Index Guide or December 1983 Vol. 13 No. 12 issue for these Antenna articles). Members of the Quad-City (Davenport, Bettendorf, Iowa and Rock Island, Moline, Illinois) based "ILLIOWA ATV GROUP" have been experimenting with several designs for the past 3 years now. A purchased SEMCON turnstile "mobile" antenna was used on their N9CAI/R ATV System as well as for some public service events including airborne FSTV pictures from a Hot-Air Balloon. The SEMCON T432 antenna is still in use today, high atop a 70 foot tower at St. Ambrose College in Davenport, Iowa. It is hanging even in an upside down mounting position (on the same mast support as a 2 Meter ground plane to minimize interference) and has been viewed by about a dozen ATV'ers at all points on the compass up to 30 miles away on an average propagation morning or evening (not enhanced) at P2 levels (10 watts average). Unfortunately, the manufacturer of this antenna in California went out of business or skipped the country, as they have been unable to be recontacted since 1983. Although a nice little antenna, there wasn't much gain (if any), but it does radiate an almost true horizontally omni-directional pattern with practically no un-noticeable side lobe peaks and valleys. Channel 24



SIX KLM-440-6 ANTENNAS

A second-antenna experiment in the fall of 1983, involved the commercially available Cushcraft AFM-440 model 8-bay dipoles (see results of this test in the "AS" October 1983 Vol. 13 No. 10 issue). This system worked as reported, after a lengthy series of antenna pattern arrangement tests were conducted. But, this array still had insufficient needed gain for P3 or higher picture strength viewings at 30 miles with 10 watts average video power to the antenna, and still had reduced-but noticeable sidelobes. This system is also "in-the-air" today and is still used as the N9CAI/R "receive" antenna.

### SIX KLM 440-6 ANTENNAS TESTED

The most recent testing of a horizontally polarized antenna system (WITH GAIN!) with an omni-directional pattern by the "ILLIOWA ATV GROUP" was conducted in the fall months of October and November of 1984. Six KLM-440 6-element Yagi beam antennas (with baluns) were purchased from PC Electronics. These antennas were chosen, as they were advertised as having 60 degree beamwidth radiation patterns at 8 db of gain. Price was \$38.00 per antenna which included the KLM impedance matching balun. Since the antennas were suppose to have 60 degree beamwidths each, six of them by theory, would cover a full circular 360 degree pattern. A four-way and a two-way splitter would also have to be inserted among the phasing harness coax lines. Some preliminary testing was accomplished as a similar project had been undertaken by the STREATOR, ILLINOIS ATV GROUP using only 4 of the KLM-440-6 antennas (see photo and short article in "AS" August 1984 Vol. 13 No. 8 issue). Results were reported to be good, but with several deep nulls inbetween the N E S W staggered directional points. The Streator group accepted this problem as their particular group member QTH's happened to fall within the beam peak directional pattern points. Good pictures can be viewed up to about a 15-20 miles radius. The 2nd preliminary test (and



a valid one) was conducted at the July 1984 Central States VHF Society Conference held in Cedar Rapids, Iowa. A single KLM 440-6 antenna was tested during the Friday afternoon Antenna Testing Contest and came up with a very respectable 7.3 db gain factor (see "A5" September 1984 Vol. 14 No. 9 issue). Now that the antenna proved it's manufactured claim, more confidence evolved in phasing six of them together for an anticipated 5 or 6 db overall gain accumulation. Keep in mind, that this proven gain figure would not increase because of the anticipated staggered antenna pattern. It would most likely, decrease a bit due to feed line, balun and connector loss.

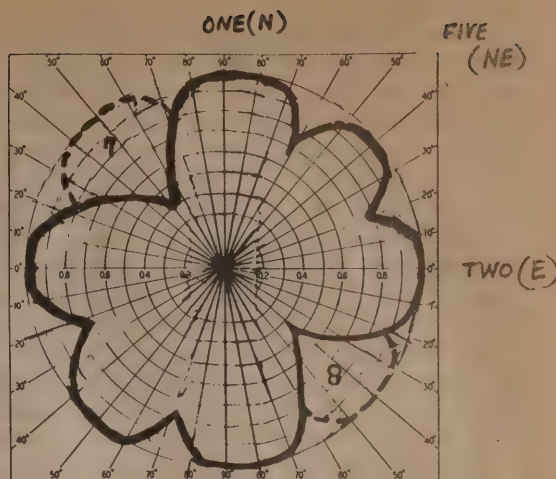
## TEST DATA

Standard UHF/ATV type gear was used for testing; BIRD 43 wattmeter with 10 and 100 watt 200-500 Mhz. slugs, PC Electronics TC-1 transceiver (6 watts average video power), ICOM IC-490A 430-440 Mhz. transceiver and various sensitive TV sets for viewing incoming test pictures. Each test was first conducted using the SSB mode of detecting the center video carrier peaks and LED meter readings, then actual TV picture displays using P-Signal reading descriptions with careful attention to "snow level" contents. An AGC metered video strength TV indicator was also used on some of the testing. Those conducting tests over a 3 day period were KA0BVT/WB0AHW, WA9RMR/WV9SR/WB9WST AND KA0BVT/WB0QCD. Since the N9CA1 Repeater System itself had the only 421.25 Mhz. crystal transmitter, initial tests were conducted on 439.25, 434.0 and 426.25 Mhz. Concern was expressed over trying to use antennas cut for 440 and above Mhz. Exact 421.25 SWR power readings will be available on the next article. It should also be noted, that 27 inch (full wave) spacing between antennas was attempted on the first two tests. Further radiation pattern tests including that of SWR power reflected revealed that as close as 13 inches could be maintained with slightly better results. The full wave spacing meant nearly 14 feet of antenna support mast. 13 inch spacing allowed slightly more than 6 feet of masting with two feet above and two feet below the array for clearance mounting (using a 10 foot pole).

## TESTS

TEST#1-All six antennas mounted in the same direction (best forward gain but not omni-directional, deep side lobes and back end rejection). TEST#2-Antennas arranged in a 60 degree N to W to E (etc) downward spiral pattern. Pattern showed some omni-directional directions but too many deep side lobes. Numbering antennas 1-6 (top to bottom), 1 and 6 were the "hottest" when pointed at source. Splitters fed 3 to top, 3 to bottom. TESTS #4 and #5 were using the same pattern but feeding differently on splitters. TEST#6-Only 4 antennas used, one each direction, N E S W. Semi omni-pattern but again, very deep-side lobes. TEST#7-Same as test #2 but different staggered pattern 1-N, 2-SE, 3-S, 4-W, 5-NE and 6-SW. Slightly better pattern, still with unacceptable lobes. TEST#8-Different pattern arrangement, 1-N, 2-E, 3-S, 4-W, 5-NE, 6-SW, splitters fed 3/3. Results Antennas 1 & 3 hottest (P3), #2 (P2); #4 (sync bars only), #5 (P2) and #6 (sync bars only). TEST#9-Changed Antennas #4 & #5 around on feed splitter. Result was #1 (P3), #2 (P1), #3 (P2), #4 (P2!), #5 (sync bars only) and #6 (P2!). TEST#9

FOUR  
(W)



SIX  
(SE)

THREE  
(S)

## TEST #11 RADIATION PLOT RESULTS

showed the first sign of all antennas working to some degree with #5 the weakest, #2 losing a bit and gain redistributed to #'s 3, 4 & 5. Still somewhat noticeable sidelobes but now tolerable. TEST#10-Since we were getting close, 18 inch spacing tried. Pattern didn't seem to change but SWR dropped a bit. We would have probably went with this pattern (pointing #5 at the closest station), but ran out of daylight on Day #2.

## ONE MORE TRY!

A few weeks passed since the first 2 days of testing, an attempted antenna raising party was called on account of rain and winds and on November 11th the 3rd and final tests were conducted between WB0QCD and KA0BVT. After careful study of previous testing results, it was noticed by WB0QCD that one type of pattern was not tested. TEST#11-18 inch spacing kept, #1-N, #2-S, #3-E, #4-W, #5-NE and #6-SW. Splitters fed the same as with TEST#2 (very important! see illustrated drawing). Results; Antenna #1 (top) P2, Antenna #2 (second from top) P2+, Antenna #3 - P2+, Antenna #4 - P2, Antenna #5 (second from bottom) P2 and Antenna #6 (bottom) P2+. Distance from ground to bottom antenna 5 feet (using 3 foot tripod). It was generally believed, that the higher antennas at such low level ground height might have had a slight advantage over the bottom antennas (probably true even at greater heights). Slight Lobes existed between antenna overlap points with two noticeable larger lobes appearing between #4 and #1, and #3 and #2 antennas. It is anticipated that any users getting caught in these reduced signal areas will witness a much better viewed signal than presently seen on the SEMCON turnstile antenna. It was felt that perhaps with the addition of yet two more KLM 440 antennas (bringing to the total of 8), these areas might be further smoothed out to get as close to a true omni-directional pattern as possible. (PART 3) A few more bucks spent at the relay site, along with a little more investment in time, can literally save individual ATV'ers hundreds of dollars, alot of potential hard feelings and possibly even the future level of support activity. We shall enter a followup report on the actual "in the field" results on this experimental system in a followup article. It should be

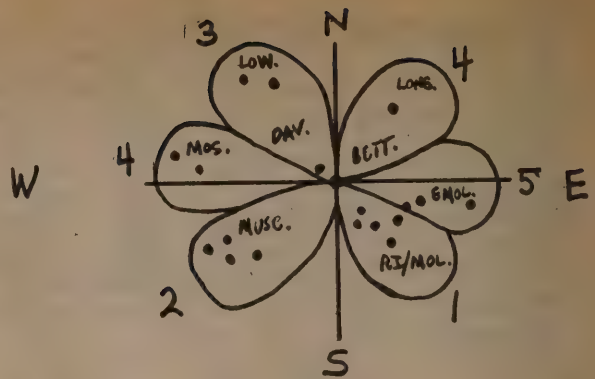


noted that the peak placement of antennas once installed (especially with the 6 beam array design) is vitally important. Map out a "true" directional graphic of where your area FSTV'ers reside to plan initial antenna placements. The slight repositioning of antennas #3 & #4 from the balanced TEST#11 configuration to better cover open lobe areas for a more universal radiation might be desirable. Once it's "in the air", reports and slight adjustments can be made to "peak" each users individual signal. This can be done by either transmitting or receiving from the relay site. There are two overlaid drawings on the graphic shown on Channel 25. The most dotted circular pattern represents how the pattern should look using 8 KLM antennas. The inward, more lobal pattern, is what we saw using just 6 KLM antennas. The six antenna design pretty well covers our particular area of activity.

### PHASING HARNESS JUMPERS

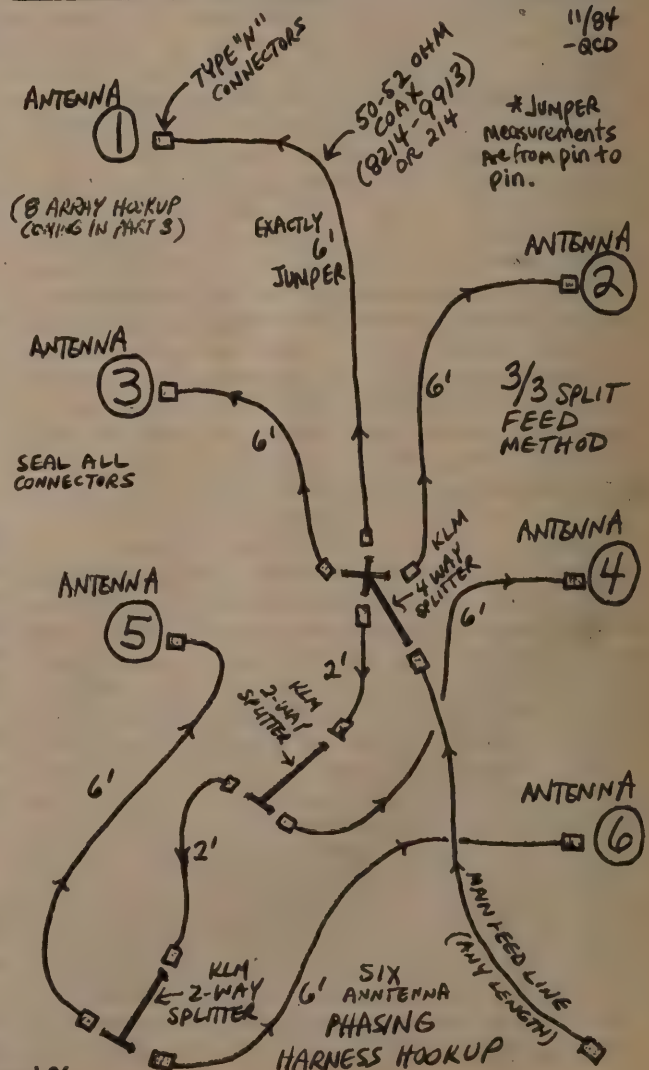
One of the big time consuming problems we encountered with this type of system was in the making up of the necessary phasing harness and putting on "Type N" connectors; 16 of them! The secret to making multi-fed antennas to work properly is in balancing and properly splitting the fed signal. Even changing the way the signal was fed into the splitters (as seen in TEST#9) made quite a difference. You can go nuts trying all the possible combinations, but you have to if you want it to work right. The routing shown, is the way that seemed to work the most balanced for us. We ended up feeding our main signal line coming from the transmitter into the 4-way splitter which one leg of it ran on down into the lower two way splitter. In otherwords, Antennas 1 (top), 2, and 3 were fed by the 4-way splitter while Antennas 4, 5 & 6 (bottom) were fed from the two-way splitters. Confused? Look at the picture! (Back to the length of the 8 jumpers). W6DRG advised exactly (to the pin) 6 foot lengths of RG8U type coax. We lucked out at one of the fall hamfests and found a dozen 10 foot jumpers (why couldn't it have been 12?) with right angle "N" connectors on Time RG-214 Coax. Connections were double checked, jumpers cut and connectors installed. Four of the 6 foot jumpers went to the KLM 4-way splitter. A short 2 foot jumper connects the second KLM two-way splitter which then connects to the main feed line (see graphic drawing this page). We battled throughout the whole ordeal with a poorly designed KLM balun hookup attachment. The tiny arms of the copper balun feed points kept breaking off and several had to be re-soldered. All were beefed up with extra solder. Also, the angle that KLM forces you to use in a supplied metal balun holding bracket piece is quite awkward. Additionally, it makes the connector and feed line to enter from the front of the antenna unlike the more traditional rear approach (there's gotta be a better way!).

Everything was taped, sealed and tightened up for winter's fury. This system is scheduled to be installed in November of 1984. As mentioned, we shall followup with the results of the experiment. We would be very interested in what your ATV Group or Club is doing toward the direction of "horizontally polarized" omni-antennas. 73's. W80QCD, "ILLINOIS ATV GROUP".



### ANTENNA RADIATION Plot PATTERN Study of QC AREA ATV'ERS QTH'S

\* Note - Antennas 4 and 5 rotated to COVER EAST / WEST positions from TEST#9. Two more Antennas were ordered at writing to cover FSTV in North + South AREAS. (PART 3)





# ARE COMMERCIALY BUILT WEFAX CONVERTER'S TOO EXPENSIVE?

## TRY USING MDS-TV CONVERTERS FOR WEATHER SATELLITE SERVICE!

by Mike Veldman WDOCTA, 110 W. 3rd St., P.O. Box 1358, Stillwater, OK. -74076

The scope of this article is to present an alternative idea for down-linking the information available to us via weather satellites. Because of the expense involved in purchasing a commercially built wefax converter, a would be weather watcher might shy away from an interesting facet of amateur radio.

The inexpensive alternative I'm suggesting is the use of readily available MDS TV converters for weather satellite service. Using the MDS converter will however require some building and some experimentation. But in the long run, the same result is obtained with much less cost. Because there are so many different MDS converter kits available (I've seen at least six different kinds at Ham Flea markets), I will cover only four that I've had occasion to experiment with.

The test antenna for my system is a 10-foot fiberglass dish normally used for DOMSAT service. The system has also been tried on a 4-foot dish which required additional preamplification and filtering and a 7-foot UHF TV dish covered with screen which performed adequately. Of the four converters tried, the ones which worked the best were the ones designed around the 3Db Hybrid. There were the Simcomm Labs SL-2B, a commercially made unit brand name test, and one purchased at Dayton just called Amateur 2384 MHz converter.

Since the MDS converters were originally built to feed a television tuner, a receiver was built with a mixer in place of the TV tuner, to mix the output of the MDS converter down to an I.F. of 18.7 MHz which feeds a Motorola MC-1357 Quadrature detector. The detector is configured similar to a design used in

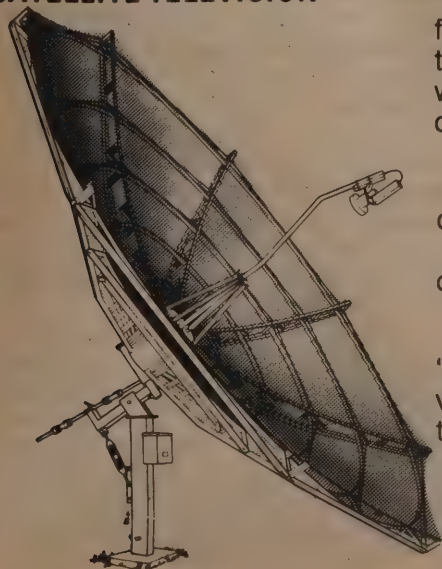
satellite TV receivers. With different L.O. injection, however, the SL-2B unit was used ahead of a 137 MHz weather satellite receiver. The only alterations performed on the MDS converters are changing the L.O. injection frequency and addition of additional shielding in places. Adjustment of the oscillator on all three kits built here is accomplished by trimming a stripline inductor on the printed circuit board. The commercial unit however, allows adjustment of the L.O. frequency with a piston cap. In all cases greater stability and reliability is gained by the addition of an external L.O. In my case, a commercially built phase locked cavity oscillator is used, but the units were also tried with a micro comm crystal controlled L.O. board which worked equally well and is more readily available.

After assembly of the kit according to the instructions packaged with it and before any alterations are made it's a good idea to see if the kit works.

The two final pieces of test equipment used are a pair of television sets. In my case it's a pair of 12 inch black and white units in plastic cases, one is used as an output device, the other as a signal source. For the signal source used to verify normal operation of the MDS converter we use the third harmonic of the UHF TV channel 47 which is 2147 MHz. For testing the wefax frequencies we use the third harmonic of channel 22 which is 1695 MHz. The tuner noise source also works well as a weak signal source to test the complete system. Tuning is achieved by connecting the MDS converter to channel 2 of the television to be used as output in the manner described in the instructions, and by placing the stub antenna or feed horn input to the converter near the second TV's UHF tuner tuned to the desired UHF channel, set the tuning control to the center of its voltage range and adjust the frequency adjustment capacitor or move a shorting stub on the P.C. trace of the local oscillator until the TV screen (on the output TV) goes completely blank. Not all televisions will show a completely blank screen. Some television sets will show streaks of color or flicker and in any case tuning the converter from side to side off of the mid-tuning point will make the picture change from snow to blank to snow if you're oscillator is on the correct frequency. This same basic procedure can be followed when using an external local oscillator once the unit is tuned up and on the desired frequency with an output device connected, either 137 MHz wefax receiver or home brew discriminator. All that's left is to hook up the antenna, in my case, a simple feed horn made from a one pound coffee can with a choke ring was used to feed the dish. So far the MDS converters have worked well in weather service. 2375 MHz ATV reception, 2384 MHz Amateur Voice Communication. Monitoring shuttle audio is the next attempt.

Well that's about it. Good Luck and Happy Weather Watching. 73's WDOCTA

## SATELLITE TELEVISION



"For further information on this project, write the author directly. Send

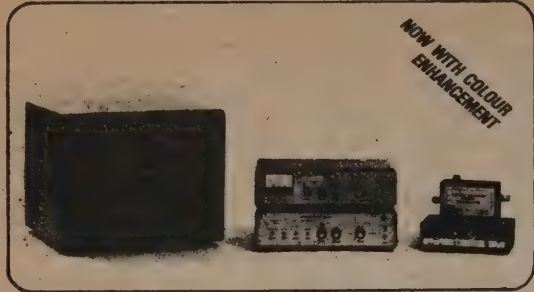
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## "FAST-FAX" MODE GAINS POPULARITY SSTV'ERS ARE SENDING SLOWER, HIGH RESOLUTION B/W COLOR PICTURES

Contrary to former beliefs by some skeptical SSTV'ers, Amateur Facsimile (FAX) is alive and well. FAX can now be heard almost daily on the HF bands of 10, 15 and 20 Meters. USA Fax operation is growing somewhat slowly in comparison to other foreign countries, but it is growing nonetheless. As SSTV'ers actually "see" good photographic quality A4/F4 rendition printouts, they begin to understand why sometimes "slower" is better. Of course, this "slower" trend has been developing for the past 3 years now within the SSTV community. It is commonplace now to tune to 14.230 and hear 34, 36 and 72 second HI-RES Slow-Scan Television pictures being sent across the nation. The much slower frame rates are now so reduced that the signal's sync-clocking "clicks" can now be detected quite noticeably as with FAX. It was amusing to hear an argument started on the 20 Meter SSTV calling/operating frequency as one SSTV'er yelled out; "get that FAX signal outta here and up above where it belongs!" (The other SSTV station was sending 72 second ROBOT Color SSTV).

As multi-mode SSTV/FAX converters are manufactured (such as the pioneering WRAASE SC-1 unit and a rumored ROBOT 1250 model to come in late 1985), along with computer interface and software programs that are written and enhanced for FAX operation, it is quite natural for the transition of SSTV to FAX to take place rather smoothly. The term "FAST-FAX" is reappearing in SSTV lingo as the description of ultra-HI RES picturing. 14.240-14.245 Mhz. seems to be the most active area used on weekends for this type of activity.

A well known, active and popular SSTV'er Virgil Mitchell K641 recently wrote to our A5 Membership Service department; "Please send the orbit schedules for the Soviet/NOAA 7&8 FAX Satellites. I now have Clay Abran's K6AEP 7.6 SSTV display program and a TRS80C HI-RES interface board from Larry Fritz for FAX. For Amateurs that have a Satellite TVRO dish, there are two excellent signals with around-the-clock Weather Facsimile broadcasts. In the west, SATCOM 3R on Transponder 3, Audio Sub-carrier 5242 KC can be heard and deciphered. The video is inverted. In the east, SATCOM 2R, on Transponder 23, Audio Sub-carrier 0418 KC is available with video information in negative form. Little or no QRM/QSB exists on these signals unlike HF bands. It seems best to use the receiver's raw video output (unfiltered) for the best picture. For K6AEP's WEFAX software use "Key1" on the receive menu to get the best copy of the above FAX space signals." -K641

It is interesting to note, that as far back as 1972 it was "A5" that was covering and "tooting the horn" so to speak for Amateur FAX. Later in 1980, it was Henry Ruh's "HF SSTV for General's" FCC Docket 88-252 (implemented 1982) that K9EUI's FAX coat tail proposal rode in on. How soon we forget past work of others. So, the next time you see an article that tells "Fax-Forget It", just forget it... -W80QC

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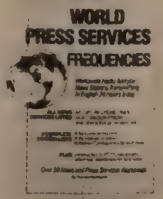
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"A5 UPDATE #2"

The National Aeronautics and Space Administration has given a tentative "greenlight" to Dr. Tony England's (W00RE), planned Amateur Radio operation on board the seven day 51-F Spacelab-II shuttle mission officially scheduled for the 17th of April 1985. The launch date could "slip" somewhat, however, since there were some "tile problems" on the "Discovery" shuttle vehicle during its last mission. The insulating tiles are needed on re-entry. Lift off could be delayed until mid-summer or even fall 1985. England, a mission specialist, will use the 2-meter transceiver originally operated by Dr. Owen Garriott, W5LFL, aboard the STS-9 as well as other HF and slow-scan ATV gear during his off duty time. The crew is made up of seven members and has another amateur onboard, John-David F. Bartoe, W4NYZ. It will be the first time that two licensed ham radio operator astronauts are on the same space shuttle flight. Mentioned, however, was that "as on STS-9 (the Owen Garriott Spacelab-I mission) the process of evaluating and testing experiment hardware and its interface with the rest of the orbiter continues until shortly before flight". NASA said that there always remains the possibility that some incompatibility or problem could develop but that this was "unexpected." A big part of amateur radio participation in the mission will be amateur slow scan television. "We will not only have slow scan onboard, but we plan to be able to uplink slowscan transmissions and send it down later." "We are also going to try to do a propagation experiment that has to do with doppler shift by transmitting a beacon on ten meters." England commented on a joint Amateur Radio-Stanford University experiment that will be undertaken. "We will have an electron gun onboard and fire an electron beam up there among the plasma (charged particles) which will form a long column. I think amateurs will be able to bounce their signals off of it. I think Amateur Radio will play an important part in the mission." NASA changed the space flight numbering system. Spacelab-I, STS-9, was the 9th flight of the Space Transportation System. Spacelab-II is dubbed 51-F. "We have tried to divorce the number from the flight sequence since some launches go out of planned order. Our flight 51-F indicated "5" being the fiscal year the flight is assigned to, the "1" indicates that it originates from Cape Kennedy (Florida) rather than a "2" which would be Vandenberg AFB, California. The "F" indicates the payload which is assigned to Spacelab-II say's England. The equipment used by Tony England, W00RE and John-David Bartoe, W4NYZ, on Board "Discovery" will be more sophisticated than that used by Owen Garriott.



"Basically what we are looking at for this mission is for the primary amateur radio mode to be slow-scan television. We will be transmitting slow-scan on some frequency in the ten meter band, probably around 29.260 MHz. The "box" will be furnished by ROBOT RESEARCH of San Diego. There will be two or three modes on ten meter FM." "One mode will be to pick up the spacecraft video.. whatever is on the shuttle video and transmit that down. The Robot system is a "frame saver." It grabs a scene, stores it in memory and then retransmits it." PANASONIC has donated five CT-101 subminiature video monitors for the Spacelab 2 "ham in space" effort. The space saving 1.5 inch miniature screen monitors will be used in the development of the 51-F amateur station that will be used by W00RE, and possibly by W4NYZ during his flight scheduled for April. Panasonic is also thought to be supplying the television cameras for the ATV portion of the mission as well. "The third mode will feature a 2-meter 6 or 8 channel scanning receiver which is capable of being locked in a couple of positions. It will have the ability to receive slow-scan on two meters, store it in memory in the Robot box and re-transmit it out on ten meters." "A variation of this is one that Roy Neal (K6DUE) of NBC News and a staunch supporter amateur efforts in space) felt very strongly about- a two meter to ten meter repeat mode. The two meter receiver will step through eight frequencies and retransmit received slow-scan video on ten meters. An amateur will be able to see his signal retransmitted from the shuttle." "The receiver will pause only about ten seconds on each channel. Whatever the 2 meter gear captures, this is what is going to be repeated." Fenner said that this was "technically complicated and we will be taxed in the time frame we have. But we think it is feasible, however, and we think we can do it." Slow-Scan will be something new for Tony England. He is a 40 meter CW man." We would like to thank Fred Maki's "W5YI Reports" and Bill Pasternak's "Westlink" Newsletters for most of the material. Get those 2 Meter Shuttle Antennas going 2/10 Meter SSTV Relay! -W80QCD

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# A HIGH RESOLUTION SSTV DISPLAY SYSTEM

## Robot 1200C Converter Meets The IBM/PC Computer - Part 3

by Clay Abrams K6AEP  
1758 Comstock Lane  
San Jose, California

This portion of the series will describe a simple software package which can be used to interface the Robot 1200 to a micro computer. This package was written in interpretative IBM/Microsoft BASIC and can be easily modified. The program was written for use under BASICA version 2.0. If another version of BASICA is used some of the software timings may have to be modified.

### The Program

This program is my first attempt to communicate with the Robot 1200. The program was written in interpretative Basic for ease in writing and debug. This whole project was completed in a few days after the Robot 1200 arrived. In this program development, I decided to use the serial port of the computer. This port is by far the easiest to program. The only hard part was the lack of handshaking in the 1200.

This program can be easily modified for any computer system which uses BASIC. The criteria for this program was to use all serial commands in the Robot 1200 program definition to see how they work. A few nice items were included like a character generator and the ability to transmit pictures in a RGB format compatible with other systems now on the air.

One of the nice features of BASIC is the speed of programming and compatibility between systems. For example, the attached program could be easily modified for the differences in BASIC in systems. Most computers now in use Microsoft Basic. The only computer which greatly differs is the Apple. The syntax of the Apple BASIC is considerably different from other machines.

The only portion of the program which has been customized is the character generator table in the beginning of the program. In this table are the character strings which can be transmitted. I found it is very easy to quit from the program and change these strings, if you wish to do so in real time. A better technique would be to add a subroutine to modify the character strings while the program is still being executed.

The only other portion of the software which is critical is the delay constants used in the beginning of the program for control of the RGB transmission sequence. These delays may have to be tweaked if the hardware configuration varies greatly from my configuration.

### Conclusions

So far the Robot 1200 has lived up to my greatest expectations. I cannot find any real significant problems with the unit. I did experience an overheating problem which required holes to be cut in the top cover, but that's all.

In the future I plan to program some very complex type of operations, but this cannot be done in Basic. I plan to use a combination of the Lattice C language and assembler language. The complex image processing will probably require the use of the 8087 math co-processor in my PC-XT to perform Fast Fourier Transforms, low pass filtering and other advanced techniques used in image processing.

These image processing techniques are beyond the ability of the low cost "toy" computers like the TRS-80C, Apple 2, and the Commodore 64 which require the power of more complex systems like the PC-XT. Another limiting factor of the "toy" type computers, are the lack of support of high languages and memory and disk storage. To process pictures in a complex manner requires huge disk space and RAM. I plan to install a 20 Mbyte hard disk in my computer just for picture storage. Floppy disks are too small to contain a significant number of pictures, even in the Robot compressed format. To store a color picture in a full resolution Robot compressed C1 format requires 138,240 of RAM and disk space. Besides this space you must also have the software resident in the computer. This could easily add another 50K of program RAM space. That makes a computer with 256K a minimum and disk storage with mega bytes a necessary requirement.

But for the average ham complex image processing is not required. The attached program will probably be satisfactory for these type of computer applications.



```

10 '*****
20 ' BASIC PROGRAM FOR THE ROBOT 1200 TO ISSUE COMMANDS BY
30 ' THE SERIAL RS-232 INTERFACE
40 ' BY: CLAY ABRAMS K6AEP
50 ' 1758 Comstock Lane
60 ' San Jose, Calif
70 ' 95124
80 ' Program written in Microsoft BASIC ver 2.0 for the IBM PC
90 ' Output will be through a async card in COM2 position
100 ' Program is not copywrite and is considered public domaine.
110 ' If program is copied or modified credit should be given
120 ' to this author for the original work.
130 '----- HARDWARE INTERCONNECTION-----
140 ' ASYNC DB-25 connector must have two jumpers pins 4-5, 6-20
150 ' the RS-232 output from the DB-25 connector is on pin 2
160 ' at the IBM computer end of the cable. The other end is
170 ' attached to the graphics input jack of the Robot 1200.
180 '*****
190 OPEN "COM2:4800,N,8" AS #1: 'Open for 4800 baud, no parity, 8 bits
200 DEFINT X 'x is an integer
210 '*****
220 ' Delay constants for SSTV xmit RGB - will vary with basic level
230 '*****
240 DELAY1 = 50 : ' inter command delay
250 DELAY2 = 500 : ' change speed delay
260 DELAY3 = 6175 : ' frame rate 8.3 seconds
270 DELAY4 = 6175 : ' frame rate blue
280 DIM NVARI(16)
290 '----- SSTV Character Buffers -----
300 'FORMAT! line1 : line2 : line3 : line4 : line5 : line6 :
310 L$ = " CLAY K6AEP SAN JOSE"
320 S$ = " K6AEP CLAY K6AEP ROBOT 1200 SAN JOSE"
330 C$ = " CQ CQ K6AEP CQ CQ "
340 D$ = " K6AEP RIG ICOM 730 3EL BEAM "
350 E$ = "COMPUTER IBM PC-XT HOME BREW PROG. "
360 '***** Main Line Program *****
370 CLS : GOSUB 1320: 'Menu for program prompt
380 ' Now look for keyboard entry
390 B$ = INKEY$ : ' Get a character
400 LOCATE 7,17 : PRINT DATE$, : PRINT TIME$
410 V$ = MID$(B$,2,1) : ' Look for 2 nd character in string
420 IF B$ = "g" THEN PRINT #1, CHR$(255);CHR$(3);: 'gray scale
430 IF B$ = "b" THEN PRINT #1, CHR$(255);CHR$(2);: 'color bars
440 IF B$ = "f" THEN PRINT #1, CHR$(255);CHR$(1);: ' Frame grab
450 IF B$ = "d" THEN PRINT #1, CHR$(255);CHR$(68);: ' Definition TP
460 IF B$ = "i" THEN PRINT #1, CHR$(255);CHR$(73);: ' invert image
470 IF B$ = "z" THEN PRINT #1, CHR$(255);CHR$(90);: 'Zoom image
480 IF B$ = "c" THEN GOTO 610 : 'Character generator
490 IF B$ = "q" THEN END : 'End program
500 IF V$ = CHR$(75) THEN PRINT #1, CHR$(255);CHR$(44);: ' cursor left
510 IF V$ = CHR$(77) THEN PRINT #1, CHR$(255);CHR$(46);: ' cursor right
520 IF V$ = CHR$(72) THEN PRINT #1, CHR$(255);CHR$(75);: ' cursor up
530 IF V$ = CHR$(80) THEN PRINT #1, CHR$(255);CHR$(76);: ' cursor down
540 IF V$ = CHR$(71) THEN PRINT #1, CHR$(255);CHR$(32);: ' erase cursor
550 IF B$ = "a" THEN PRINT #1, CHR$(255);CHR$(75);: GOTO 640 : ' quad top left
560 IF B$ = "x" THEN PRINT #1, CHR$(255);CHR$(76);: GOTO 640 : ' quad top right
570 IF B$ = "e" THEN PRINT #1, CHR$(255);CHR$(44);: GOTO 640 : ' quad bottom left
580 IF B$ = "h" THEN PRINT #1, CHR$(255);CHR$(46);: GOTO 640 : ' quad bottom right
590 IF B$ = "s" THEN GOTO 1560: 'status/control commands
600 GOTO 390

```

Channel 31

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```

610 '#####
620 ' Character Generator Routines
630 '#####
640 CLS : LOCATE 1,1
650 PRINT " Character Generator Routines"
660 PRINT " a = SMALL white"
670 PRINT " b = SMALL black"
680 PRINT " c = LARGE white"
690 PRINT " d = LARGE black"
700 PRINT " e = magenta small overlay"
710 PRINT " f = red small overlay"
720 PRINT " g = yellow small overlay"
730 PRINT " h = cyan small overlay"
740 PRINT " i = blue small overlay"
750 PRINT " q = quit NO character return to main"
760 PRINT
770 PRINT
780 PRINT
790 B$ = INKEY$
800 IF B$ = "a" THEN X=64 : GOTO 1110
810 IF B$ = "c" THEN X=192 : GOTO 900
820 IF B$ = "d" THEN X=199 : GOTO 900
830 IF B$ = "e" THEN X=68 : GOTO 1040
840 IF B$ = "f" THEN X=69 : GOTO 1040
850 IF B$ = "g" THEN X=65 : GOTO 1040
860 IF B$ = "h" THEN X=66 : GOTO 1040
870 IF B$ = "i" THEN X=70 : GOTO 1040
880 IF B$ = "q" THEN GOTO 370
890 GOTO 790
900 '#### Large characters #####
910 CLS : LOCATE 1,1 : PRINT "Select display a= name, b= CB"
920 INPUT V$
930 IF V$ = "a" THEN GOTO 950
940 IF V$ = "b" THEN GOTO 960
950 TYP$ = L$ : GOTO 970
960 TYP$ = C$ : GOTO 970
970 PRINT #1, CHR$(255);CHR$(0);
980 FOR I = 1 TO 25
990 PRINT #1, CHR$(X); : 'attribute byte
1000 PRINT #1, MID$(TYP$,I,1);
1010 NEXT I
1020 GOTO 370
1030 '#### Smaller characters #####
1040 CLS : LOCATE 1,1 : PRINT "Select display a=SSTV, b=rig, c=computer ?"
1050 INPUT Q$
1060 PRINT : PRINT "Do you wish different back / character colors y or n ?"
1070 INPUT R$ : IF R$ = "y" THEN P = 1 ELSE P = 0
1080 IF Q$ = "a" THEN TYPE$ = S$ : GOTO 1110
1090 IF Q$ = "b" THEN TYPE$ = D$ : GOTO 1110
1100 IF Q$ = "c" THEN TYPE$ = E$ ELSE GOTO 1040
1110 PRINT #1, CHR$(255);CHR$(0);
1120 FOR I = 1 TO 52
1130 IF P = 1 GOTO 1190 : 'select attribute different for each character
1140 PRINT #1, CHR$(X); : 'attribute byte
1150 PRINT #1, MID$(TYPE$,I,1);
1160 NEXT I
1170 GOTO 370
1180 '##### Make character color/ background different #####
1190 IF MID$(TYPE$,I,1) = " " THEN X = 64 : GOTO 1140
1200 GOSUB 2080 : 'randomize the attribute characters

```

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## Electro-Imaging VIDEO PRINTER

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The printer's applications are unlimited;  
you can use it to make prints of:

- your favorite television personalities, movies or events
- important or controversial plays in sports
- addresses and phone numbers of TV offers
- video surveillance images for a permanent security record
- portraits of friends and family (using a home video camera); you don't even need a monitor! You get a print of what you see in your viewer!
- home computer text and graphics and hard copies of teletext data and other computer information sources
- educational or cultural information such as language or cooking lessons, health and exercise programs, news, economic programs with stock market quotations, weather forecasts, etc.

In fact, anything that can be displayed on a video screen\* can be converted instantly into a print.

### FEATURES AND SPECIFICATIONS

- **Instant Response**—you push a button, and the picture on your TV screen is instantly stored on a special memory chip and printed immediately.
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- **Wired Remote Control Unit**—lets you "snap" the screen the instant you want to, from the comfort of your chair and up to 16' away from the printer.
- **Specifications**—Power consumption: 65W 110 VAC, Weight: 11 lb. 14 oz., Dimensions: (HxWxD) 4 1/2"x8 1/2"x14 1/2" approx.

\*Note: The Video Printer requires an NTSC composite video signal such as is available at the VIDEO output of VCRs, video disc players, monitors, home computers, video cameras, etc. It cannot be hooked up or used with a TV set lacking a VIDEO output connection.

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```

1210 RESTORE
1220 FOR M = 1 TO 16
1230 READ NVAR1(M)
1240 NEXT M
1250 TEMP1 = NVAR1(VAR1) : TEMP2=NVAR1(VAR2+7)
1260 X = TEMP1 OR TEMP2
1270 GOTO 1140
1280 DATA 7,6,5,4,3,2,1,0,56,48,40,32,24,16,8,0 : 'attribute color
1290 '*****
1300 ' Menu for the main screen.
1310 '*****
1320 PRINT "
1330 PRINT "
1340 PRINT " Program by: Clay Abrams K6AEP
1350 PRINT " Serial interface routines for Robot 1200
1360 PRINT " Select the program options ?
1370 PRINT " Revision 1.0 To end program type q 8-20-1984
1380 PRINT "
1390 PRINT "
1400 PRINT " g = Gray Scale on screen
1410 PRINT " b = Color Bars on screen
1420 PRINT " f = Frame grab from camera
1430 PRINT " d = Definition test pattern
1440 PRINT " i = Invert image
1450 PRINT " z = Zoom on image
1460 PRINT " c = Character Generator
1470 PRINT " Cursor = Arrows on K/B
1480 PRINT " Home = Erase cursor
1490 PRINT " a = Quad top-left
1500 PRINT " x = Quad top-right
1510 PRINT " e = Quad bottom-left
1520 PRINT " h = Quad bottom-right
1530 PRINT " s = control/status commands
1540 PRINT "
1550 RETURN
1560 '*****
1570 ' Control commands for Robot 1200
1580 '*****
1590 LOCATE 1,1: CLS
1600 PRINT " Control Commands for Robot 1200 "
1610 PRINT " Select a key option ? "
1620 PRINT " q = quit control selection"
1630 PRINT " *** memory selection *****"
1640 PRINT " r = red memory "
1650 PRINT " g = green memory "
1660 PRINT " b = blue memory"
1670 PRINT " c = composite"
1680 PRINT " p = page 1"
1690 PRINT " a = page 2"
1700 PRINT " *** speed selection *****"
1710 PRINT " 8 = 8/12 sec"
1720 PRINT " 1 = 12/24 sec"
1730 PRINT " 2 = 24/36 sec"
1740 PRINT " 3 = 36/72 sec"
1750 PRINT " *** transmit / rec *****"
1760 PRINT " v = receive "
1770 PRINT " t = transmit x= xmit RGB pict 8 sec 2X2X2"
1780 PRINT " s = standby"
1790 PRINT " *** memory *****"
1800 PRINT " m = memory"

```

Attention Robot 400 Owners!



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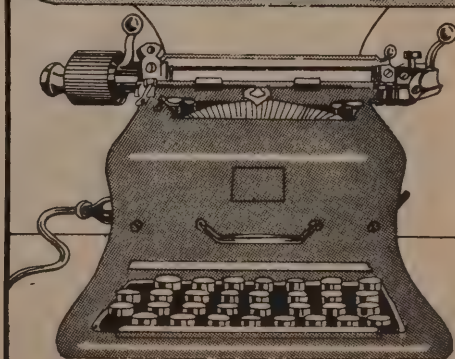
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```

1810 PRINT "e = camera"
1820 PRINT
1830 V% = INKEY$
1840 IF V% = "q" GOTO 360
1850 IF V% = "r" THEN PRINT #1,CHR$(37);
1860 IF V% = "g" THEN PRINT #1,CHR$(36);
1870 IF V% = "b" THEN PRINT #1,CHR$(35);
1880 IF V% = "c" THEN PRINT #1,CHR$(27);
1890 IF V% = "p" THEN PRINT #1,CHR$(29);
1900 IF V% = "a" THEN PRINT #1,CHR$(28);
1910 IF V% = "8" THEN PRINT #1,CHR$(34);
1920 IF V% = "1" THEN PRINT #1,CHR$(33);
1930 IF V% = "2" THEN PRINT #1,CHR$(26);
1940 IF V% = "3" THEN PRINT #1,CHR$(25);
1950 IF V% = "v" THEN PRINT #1,CHR$(8);
1960 IF V% = "t" THEN PRINT #1,CHR$(16);
1970 IF V% = "s" THEN PRINT #1,CHR$(0);
1980 IF V% = "m" THEN PRINT #1,CHR$(10);
1990 IF V% = "e" THEN PRINT #1,CHR$(11);
2000 IF V% = "x" THEN GOTO 2120
2010 GOTO 1830
2020 '*****
2030 ' Routine to generate random numbers in two variables
2040 ' none of which are ever the same. These numbers will
2050 ' be used as a table look up for character generator
2060 ' attributes
2070 '*****
2080 VAR1 = (INT(RND * (8)) + 1)
2090 VAR2 = (INT(RND * (8)) + 1)
2100 IF VAR1 = VAR2 GOTO 2080
2110 RETURN
2120 '*****
2130 ' Xmit a SSTV picture in RGB 2 X 2 X 2
2140 '*****
2150 PRINT #1, CHR$(34); : ' switch to 8 sec color
2160 FOR K = 1 TO DELAY2 : NEXT K
2170 PRINT #1, CHR$(37); : ' switch to red frame
2180 FOR K = 1 TO DELAY1 : NEXT K
2190 PRINT #1, CHR$(16); : ' xmit a picture
2200 PRINT "xmitting 2 red frames",TIME$
2210 GOSUB 2400 : ' delay 9 sec
2220 PRINT #1, CHR$(16); : ' xmit a picture
2230 GOSUB 2400 : ' delay 9 sec
2240 FOR K = 1 TO DELAY1 : NEXT K
2250 PRINT #1, CHR$(36); : ' switch to green frame
2260 PRINT "xmitting 2 green frames",TIME$
2270 PRINT #1, CHR$(16); : ' xmit a picture
2280 GOSUB 2400
2290 PRINT #1, CHR$(16); : ' xmit a picture
2300 GOSUB 2400
2310 FOR K = 1 TO DELAY1 : NEXT K
2320 PRINT #1, CHR$(35); : ' switch to blue frame
2330 FOR K = 1 TO DELAY1 : NEXT K
2340 PRINT #1, CHR$(16); : ' xmit
2350 PRINT "xmitting 2 blue frames",TIME$
2360 GOSUB 2440
2370 PRINT #1, CHR$(16); : ' xmit
2380 GOSUB 2440
2390 GOTO 1580
2400 '*****

```

2410 'program to provide a time delay of 8.3 seconds

2420 '\*\*\*\*\*

2430 FOR R = 1 TO DELAY3 : NEXT R : RETURN

2440 FOR R = 1 TO DELAY4 : NEXT R : RETURN

**"STAY TUNED TO A5 ATV MAGAZINE™**  
**for more information regarding this K6AEP Robot**  
**1200C/IBM PC computer Interface System"**

#### PART FOUR

- Parallel Port Operation
- Results

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# FOUR CHARACTER COCO SERIAL GRAPHICS FOR THE ROBOT 1200C SSTV CONVERTER!

Complex Parallel Programs Rewritten For  
Serial Interfacing Written Exclusively For

"A5 ATV Magazine"™

by D.E. Wright KQ9T  
2331 Balsam Way  
Green Bay, Wisc. 54303

PREFACE-"A5" has published a long line of Radio Shack TRS80C Color Computer articles, software programs and interface information relating to Amateur Radio modes. USATVS Member "Duke" Wright KQ9T recently sent us his rendition for using the COCO with ROBOT'S new 1200C HI-RES Color SSTV Converter. It is the only known published program that incorporates all four of the character graphic modes including a self-prompting MENU. Other basic serial interface programs have been written for the earlier modified ROBOT 400C and still available 450C models (send an SASE to our "Membership Services Dept." for printout hardcopies). Within this issue, we conclude PART 3 of our K6AEP 4-PART series on using the 1200C with an IBM PC Computer. Carl Berry K5MAN of Scottsdale, Arizona has a similar version for the popular COMMODORE 64 Computer (article coming). The ailing SSTV TODAY publication (November 84 issue) published an incomplete 57 line program written by Alan Applegate K8BG with mention of the rest of the remaining "graphics" listings to be published in another issue (guess they ran out of space in their big 12 page "K8BLU farewell" issue?). For further information, contact the author directly (always send SASE). -W8BQCD

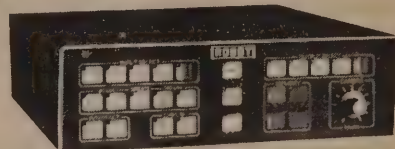
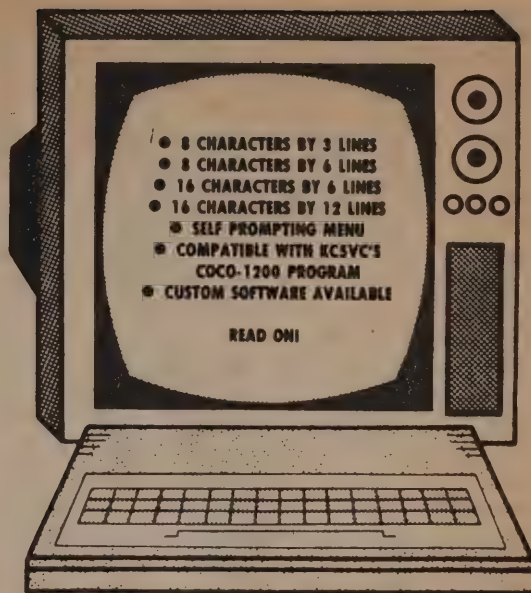
## SERIAL INTERFACE CONTROLLER PROGRAM FOR USE WITH THE ROBOT 1200C

The designers of the ROBOT 1200C wrote into the unit's ROM four different graphic character sizes -- 8 characters by 3 lines, 8 characters by 6 lines, 16 characters by 6 lines and 16 characters by 12 lines. The first two sizes can easily be brought up by a simple basic program and of very simple interface consisting of a two-conductor cable from the computer's RS-232 output to the "graphics photo jack" on the 1200C. The 2nd two graphics sizes (16X6 and 16X12) were designed to work with a more complex parallel interface. This program will bring up all four character sizes with a more easily handled serial interface. Merely construct the cable as outlined below, CLOAD and RUN the program and you are ready to go. The program features self prompting menus and is very easy to use. \*One important point if you do not use the entire line for graphics, you must space to the end of the line with either the space bar (which will fill the spaces to the end of the line with the background color selected).

(Program listed on Channels 36 & 37).

This program works very nicely when appended to the control portion of KC5VC's COCO-1200 software program. If you would like such a version, along with some special effects like "framing and screen painting" as well as customized callsign and name, send a good quality, low-noise cassette with an SASE to the address shown above. Good luck "A5" SSTV'ers, see you on 14.230 Mhz! 73's -KQ9T

Channel 35



### SAVE BIG DOLLARS ON K6AEP TRS80C COLOR COMPUTER INTERFACES!

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```

10 '1200C SERIAL GRAPHICS FOR ALL 4 CHARACTER SETS
20 'BY: D. E. WRIGHT, 2331 BALSAM WAY, GREEN BAY, WI 54303 (KQ9T)
30 POKE149,0:POKE150,7
40 DINA(16):DINB(16)
50 CLS
60 PRINT#37,"SELECT CHARACTER SIZE":PRINT#141,"1>8X3":PRINT#205,"2>8X6":PRINT#269,"3>16X8":PRINT#333,"4>16X12"
70 A$=INKEY$
80 IFA$="1"THEN1050
90 IFA$="2"THEN1230
100 IFA$="3"THEN950
110 IFA$="4"THEN130
120 GOTO70
130 CLS:PRINT#228,"SELECT 16X12 LINE NUMBER":PRINT#266,"<1 TO C(12)>"
140 R=0
150 A$=INKEY$
160 IFA$="A"THENQ=44:S=64:Y=24:W=16:P=46:U=24:V=16:M=10:GOTO290
170 IFA$="B"THENQ=44:S=64:Y=32:W=8:P=46:U=32:V=8:M=11:GOTO290
180 IFA$="C"THENQ=44:S=64:Y=40:W=0:P=46:U=40:V=0:M=12:GOTO290
190 IFA$="2"THENQ=75:S=64:Y=0:W=32:P=76:U=8:V=32:M=2:GOTO290
200 IFA$="3"THENQ=75:S=64:Y=16:W=24:P=76:U=16:V=24:M=3:GOTO290
210 IFA$="4"THENQ=75:S=64:Y=24:W=16:P=76:U=24:V=16:M=4:GOTO290
220 IFA$="5"THENQ=75:S=64:Y=32:W=8:P=76:U=32:V=8:M=5:GOTO290
230 IFA$="6"THENQ=75:S=64:Y=40:W=0:P=76:U=40:V=0:M=6:GOTO290
240 IFA$="7"THENQ=44:S=64:Y=0:W=40:P=46:U=0:V=40:M=7:GOTO290
250 IFA$="8"THENQ=44:S=64:Y=8:W=32:P=46:U=8:V=32:M=8:GOTO290
260 IFA$="9"THENQ=44:S=64:Y=16:W=24:P=46:U=16:V=24:M=9:GOTO290
270 IFA$="1"THENQ=75:S=64:Y=0:W=40:P=76:U=0:V=42:M=1:GOTO290
280 GOTO150
290 CLS
300 PRINT#0,"LINE NUMBER "N:PRINT#72,"CHARACTER COLOR"
310 PRINT#120,"W>WHITE,Y>YELLOW,C>CYAN,G>GREEN,M>MAGENTA,R>RED,
    B>BLUE,L>BLACK, D>DEFAULT,ENTER>MENU, RIGHT ARROW>BACKGROUND FILL"
320 GOTO660
330 PRINT"ENTER UP TO 16 LETTERS--LINE "M
340 IFR=1THENI=I+128
350 M=I
360 A$=INKEY$
370 IFA$=" "THEN360
380 IFN=0THENN=I
390 C=I
400 IFA$=CHR$(32)THENC=64:IFR=10R2THENC=192
410 IFA$=CHR$(8)THENN=N-1:PRINTTAB(10)N"--TAB(15)A$:GOTO360
420 IFA$=CHR$(9)THENA$=CHR$(32)
430 PRINTTAB(10)N"--TAB(15)A$
440 IFN=17THENC=192:PRINT#234,"print line"M
450 IFR=2ANDN=9THENC=192:PRINT#234,"print line "M:GOTO1140
460 IFR=3ANDN=9THENC=192:PRINT#234,"print line "M:GOTO1140
470 IFN=17THENS00
480 B(N)=C
490 A(N)=ASC(A$):N=N+1:GOTO360
500 PRINT#-2,CHR$(255);:PRINT#-2,CHR$(0);
510 PRINT#-2,CHR$(255);:PRINT#-2,CHR$(0);
520 IFY=0THENS40
530 FORX=1TOV:PRINT#-2,CHR$(S);:PRINT#-2,CHR$(32);:NEXTX
540 FORX=1TOB:PRINT#-2,CHR$(B(X));:PRINT#-2,CHR$(A(X));:NEXTX:FORZ=1TOV:PRINT#-2,CHR$(64);:PRINT#-2,CHR$(32);:NEXTZ
550 FORT=1TO300:NEXTT
560 PRINT#-2,CHR$(255);:PRINT#-2,CHR$(P);:PRINT#-2,CHR$(255);:PRINT#-2,CHR$(0);
570 IFU=0THENS90
580 FORX=1TOU:PRINT#-2,CHR$(S);:PRINT#-2,CHR$(32);:NEXTX
590 FORX=1TOB:PRINT#-2,CHR$(B(X+8));:PRINT#-2,CHR$(A(X+8));:NEXTX:FORZ=1TOV:PRINT#-2,CHR$(64);:PRINT#-2,CHR$(32);:NEXTZ:
600 Y=Y+8:W=W-8:U=U+8:V=V-8
610 IFM=3ANDR=1THENO=44:Y=0:W=16:P=46:U=0:V=16
620 IFM=6ANDR=1THENRUN
630 IFY>47THENO=44:P=46:Y=0:W=40:U=0:V=40
640 M=M+1:IFM=13THENS0ELSE290
650 GOTO50
660 A$=INKEY$
670 IFA$="W"THENA=0:GOTO780
680 IFA$=CHR$(13)THENS0
690 IFA$="Y"THENA=1:GOTO780
700 IFA$="C"THENA=2:GOTO780
710 IFA$="G"THENA=3:GOTO780
720 IFA$="M"THENA=4:GOTO780
730 IFA$="R"THENA=5:GOTO780
740 IFA$="B"THENA=6:GOTO780
750 IFA$="L"THENA=7:GOTO780
760 IFA$="D"THENI=57:CLS:GOTO920
770 GOTO660
780 PRINT#72,"BACKGROUND COLOR":PRINT#192,"0>OVERLAY"

```

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```

790 A$=INKEY$
800 IFA$="W"THENB=0:GOTO910
810 IFA$="Y"THENB=8:GOTO910
820 IFA$="C"THENB=16:GOTO910
830 IFA$="G"THENB=24:GOTO910
840 IFA$="CHR$(13)"THENB=0
850 IFA$="M"THENB=32:GOTO910
860 IFA$="R"THENB=40:GOTO910
870 IFA$="B"THENB=48:GOTO910
880 IFA$="L"THENB=56:GOTO910
890 IFA$="D"THENB=64:GOTO910
900 GOTO790
910 I=A+B
920 IFR=2GOTO1120
930 IFR=3THEN1330
940 CLS:GOTO330
950 CLS:PRINT@228,"SELECT 16X6 LINE NUMBER":PRINT@267,"(1 TO 6)"
960 R=1:G=192
970 A$=INKEY$
980 IFA$="1"THENQ=75:Y=0:W=16:P=76:U=Y:V=W:M=1:GOTO290
990 IFA$="2"THENQ=75:Y=0:W=8:P=76:U=Y:V=W:M=2:GOTO290
1000 IFA$="3"THENQ=75:Y=16:W=0:P=76:U=Y:V=W:M=3:GOTO290
1010 IFA$="4"THENQ=44:Y=0:W=16:P=46:U=Y:V=W:M=4:GOTO290
1020 IFA$="5"THENQ=44:Y=8:W=0:P=46:U=Y:V=W:M=5:GOTO290
1030 IFA$="6"THENQ=44:Y=16:W=0:P=46:U=Y:V=W:M=6:GOTO290
1040 GOTO970
1050 CLS:PRINT@229,"SELECT 8X3 LINE NUMBER":PRINT@268,"(1 TO 3)"
1060 A$=INKEY$
1070 K=192
1080 IFA$="1"THENY=0:W=16:R=2:M=1:GOTO290
1090 IFA$="2"THENY=8:W=8:R=2:M=2:GOTO290
1100 IFA$="3"THENY=16:W=0:R=2:M=3:GOTO290
1110 GOTO1060
1120 CLS:PRINT@32,"ENTER UP TO 8 LETTERS--LINE "M
1130 I=1+128:GOTO350
1140 PRINT#-2,CHR$(255);:PRINT#-2,CHR$(0);
1150 IFY=0THEN1170
1160 FORX=1TOY:PRINT#-2,CHR$(K);:PRINT#-2,CHR$(32);:NEXTX
1170 FORX=1TOB:PRINT#-2,CHR$(B(X));:PRINT#-2,CHR$(A(X));:NEXTX:FORZ
=1TOW:PRINT#-2,CHR$(64);:PRINT#-2,CHR$(32);:NEXTZ
1180 Y=Y+B:W=W-B
1190 M=M+1
1200 IFR=2ANDM=4THENRUN
1210 IFR=3ANDM=7THENRUN
1220 GOTO290
1230 CLS:PRINT@229,"SELECT 8X6 LINE NUMBER":PRINT@267,"(1 TO 6)"
1240 K=64:R=3
1250 A$=INKEY$
1260 IFA$="1"THENY=0:W=40:M=1:GOTO290
1270 IFA$="2"THENY=8:W=32:M=2:GOTO290
1280 IFA$="3"THENY=16:W=24:M=3:GOTO290
1290 IFA$="4"THENY=24:W=16:M=4:GOTO290
1300 IFA$="5"THENY=32:W=8:M=5:GOTO290
1310 IFA$="6"THENY=40:W=0:M=6:GOTO290
1320 GOTO1250
1330 CLS:PRINT@32,"ENTER UP TO 8 LETTERS--LINE "M:GOTO350

```

Note\* There is a 4.4 revised version of this program which was released in December '84 after this printing. For a copy, send a SASE to "A5 MEMBERSHIP SERVICES". Mention the KQ9T Program.

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11/84



## STANDBY FOR 1985 "A5" WORKED-ALL-STATES SSTV CONTEST!

BEGINS 0001 JANUARY 21st, ENDS 2400 JANUARY 27th, 1985

We are trying a few things different this time in our annual January "Worked-All-States" SSTV Contest. First, we are purposely publicizing future contests only in the USATVS Journal. We still send "contests dates of operation" to other Amateur publications but no specifics. Why should non-A5/USATVS supporters work YOUR contest against you when they have nothing to do with our organization? If they pick up on the rules and guidelines on their own and submit entries, we have to honor them (Keep that in mind when your getting points from them!). This year's 1985 W.A.S. SSTV Contest has been extended to a full week operation period. The Contest starts at 0001 Monday January 21st and runs thru 2400 Sunday January 27th. All recognized SSTV operating frequency areas on all bands permissible. Should 160 Meters become available by Contest time, this band is eligible also. Due to the extended SSTV Contest operating period, we do not feel the need to request any established SSTV Nets on Saturday to refrain from such operation as honored past years. In fact, a "new" receive only category has been added, in which the monitoring of "SSTV NETS" becomes very beneficial to the W.A.S. operator.

### POINT TABLE

In the table shown below, successful two-way SSTV Picture exchanges are worth 100 points (regardless of frame rate). Color SSTV Pictures (line of frame sequential) have been designated a 200 point factor (not 100 plus 200 = 300 - just 200). A "bonus" of 500 points can be claimed for each "new" state. Additional contacts with the same station on another band is permissible and scored independently.

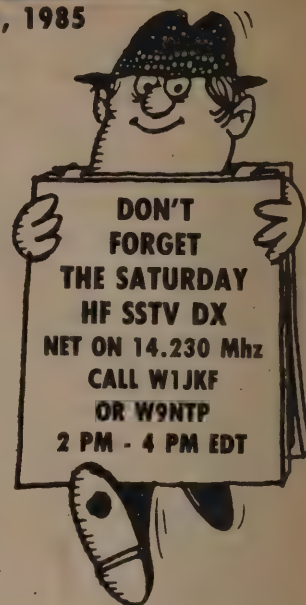
Foreign DX stations count only in the 100 or 200 point categories and are welcome and encouraged to take part in the contest. All contacts must show a minimum of callsign and state and signal report (RSV) in SSTV "Video". Place finishers in past "A5" W.A.S. SSTV Contests have already been mailed special "Worked-All-States" cardboard maps to "color in as they get them." If you have not worked the A5 W.A.S. SSTV Contest before and would like one of these maps, drop us a line or better yet call Pat on our "A5 HOTLINE". She will mail you one out immediately. Last years top finishers were (1st Place DX - FN7CDA with 1,622 pts.) (1st Place USA - KE1Y) (2nd Place - VE4AD6), (3rd Place KB6WP), (4th Place - VE3JW) and (5th Place - WD9IPX).

All logs, contest scoring sheets, etc. must be postmarked no later than January 30th, 1985. PRIZES will be awarded to the top place finishing winners. All entrants will receive participation certificates regardless of scoring. Send logs to; "A5" W.A.S. SSTV Contest Manager, P.O. Box H, Lowden, Iowa 52255. Results should be listed in our March or April issue.

### 1985 "A5" W.A.S. SSTV CONTEST POINT ACCUMULATION

RECEIVE ONLY B/W PICTURES	25	POINTS
RECEIVE ONLY COLOR PICTURES	50	POINTS
VERIFIED 2-WAY B/W QSO	100	POINTS
VERIFIED 2-WAY COLOR QSO	200	POINTS
NEW USA STATE CONTACT	500	POINTS

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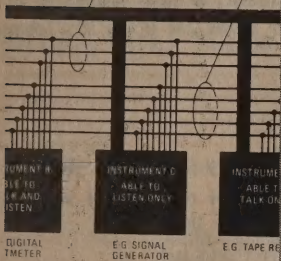
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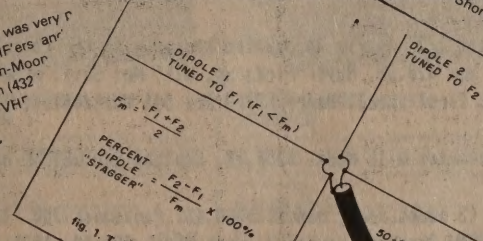
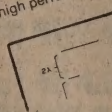
F antennas and  
systems

is probably no other topic that inspires such a line of conversation than the line of antennas. Hardly a day goes by when I'm not asked questions about antennas. What's the best antenna for VHF/UHF? What's the best antenna for HF? The reason we're so interested in antennas is that there is no other subject that has so much potential for improvement.

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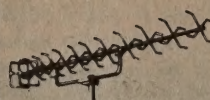
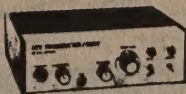
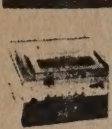
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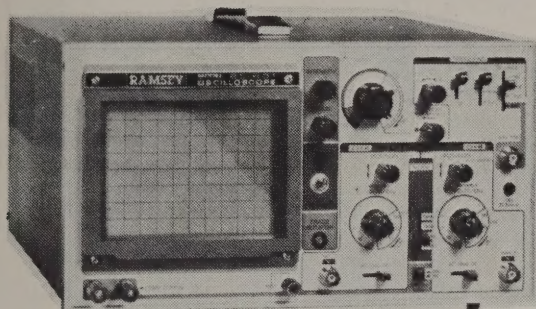
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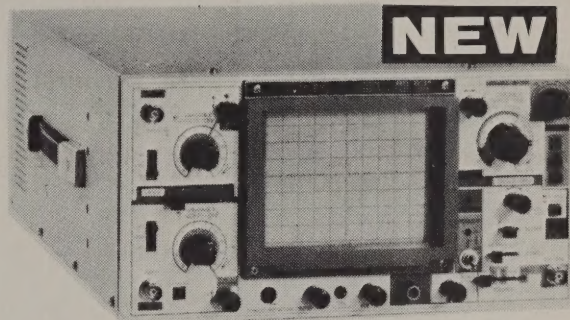
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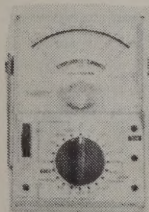
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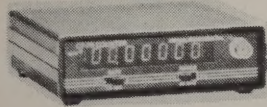


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**\$149.95**

wired includes AC adapter

CT-90 kit ..... \$129.95  
OV-1 0.1 PPM oven timebase ..... \$9.95  
BP-4 nicad pack ..... 8.95



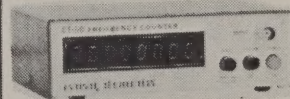
### CT-125 9 DIGIT 1.2 GHz COUNTER

A 9 digit counter that will outperform units costing hundreds more. • gate indicator • 24mV @ 150 MHz typical sensitivity • 9 digit display • 1 ppm accuracy • display hold • dual inputs with preamps

**\$169.95**

wired includes AC adapter

BP-4 nicad pack ..... 8.95



### CT-50 8 DIGIT 600 MHz COUNTER

A versatile lab bench counter with optional receive frequency adaptor, which turns the CT-50 into a digital readout for most any receiver • 25 mV @ 150 MHz typical sensitivity • 8 digit display • 1 ppm accuracy

**\$169.95**

wired

CT-50 kit ..... \$139.95  
RA-1 receiver adapter kit ..... 14.95



### DM-700 DIGITAL MULTIMETER

Professional quality at a hobbyist price. Features include 26 different ranges and 5 functions • 3 1/2 digit, 1/2 inch LED display • automatic decimal placement • automatic polarity

**\$119.95**

wired includes AC adapter

DM-700 kit ..... \$99.95  
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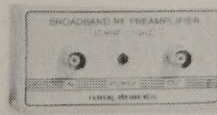
### PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies UP in frequency • great for PL tone measurements • multiplies by 10 or 100 • 0.01 Hz resolution & built-in signal preamp/conditioner

**\$49.95**

wired

PS-2 kit ..... \$39.95



### PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for shifting RF • ideal receiver/TV preamp

**\$44.95**

wired includes AC adapter

PR-2 kit ..... \$34.95



### PS-1B 600 MHz PRESCALER

Extends the range of your present counter to 600 MHz • 2 stage preamp • divide by 10 circuitry • sensitivity: 25mV @ 150 MHz • BNC connectors • drives any counter

**\$59.95**

wired includes AC adapter

PS-1B kit ..... \$49.95

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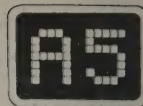
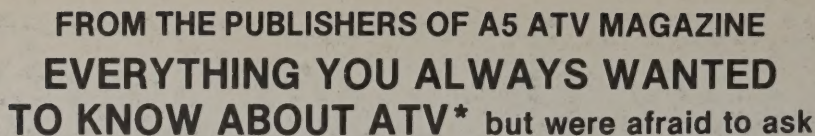
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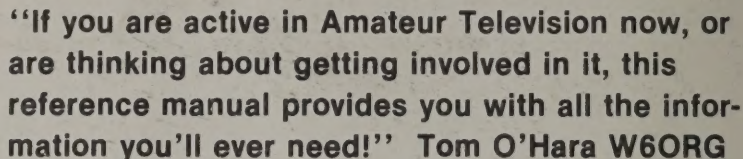
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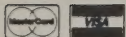
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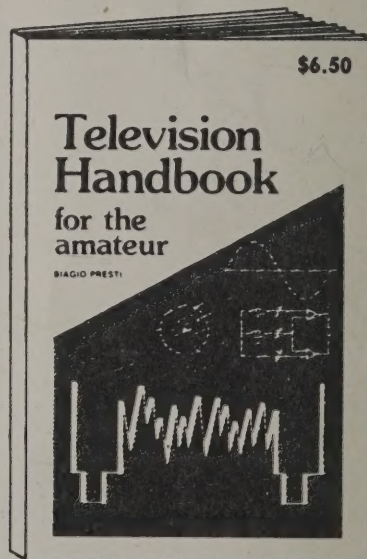
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